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The Portuguese Air Force

A Look Ahead

Lt Gen Luís Evangelista Esteves de Araújo, Portuguese Air Force

DEVELOPING A VISION of the future in a time marked by asymmetries and discontinuities calls for circumspection, especially to properly perceive the constant changes taking place around us and the speed with which they unfold. Despite the current environment of accelerated change and our heavy reliance on emerging technologies and practical doctrines for using available assets, the enduring characteristics, capabilities, and principles of airpower employment provide a needed intellectual anchor for anticipating action. However, we can rest assured that the air force of the future will certainly be an heir to the one that exists today, which, in turn, remembers what it has learned from its predecessor. This relationship becomes apparent, for example, when one sees that our past national objectives dictated the employment of air assets in vast and remote theaters of operations. Those objectives became a de facto precursor to the development of capabilities that we call expeditionary during the present time, when mission accomplishment depends on a mind-set of excellence, reflected in the motto "serve well by performing well." Thus, one can see the future of the air force only from a logic of seamless values and goals indelibly infused with a specific institutional culture.

The air force of the future will mirror the nation's wishes, since its political leadership must define strategic objectives, assign missions, and ensure the availability of assets and resources required to achieve them. Furthermore, one of the main premises of building a vision for the future entails understanding that the cycle governing the acquisition and development strategy (indispensable for defining and building future capabilities) is much more sweeping than that of technological and doctrinal changes. As a result, one should consider investing funds beyond acquisition costs in resources needed to support, sustain, and upgrade available assets or to acquire new ones. Doing so will assure the viability of a credible force in an ever-changing world environment.

In examining the broad outlines of national strategy, one notes the relevance of the "cooperative security" concept and the concomitant requirement for Portugal to contribute military assets and capabilities aimed at ensuring security and defense in current areas of interest, preferably through a collective construct. The concept of "forward defense" means, above all, participating actively and deliberately on behalf of universal values, expressing solidarity, and affirming legitimate interests in accordance with foreign-policy imperatives defined in a multilateral framework. In the last decade, therefore, the armed forces have undertaken missions that have expanded their dominance in the application process and dramatically increased the frequency of their taskings to confront situations that only the armed forces could meet, despite their unresolvability by military means—that is, those missions in support of our foreign policy. That necessarily implies qualitative changes in the acquisitional, developmental, structural, and operational areas of our military force.

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Insofar as the air force is concerned, the characteristics of its current or future weapon systems—such as speed, mobility, range, and flexibility of employment, in independent, joint, or combined operations—allow those systems to contribute decisively to foreseeable employment scenarios. Specifically, the air force should continue to develop capabilities that allow it to conduct surveillance and defense of both Portuguese airspace and the area between Portugal, Madeira, and the Azores—also known as the Portuguese Strategic Triangle. These capabilities would contribute to freedom of action by surface forces and facilitate other air operations such as strategic and tactical airlift, combat air patrols, surveillance, search and rescue, and personnel recovery.

A force so organized, thanks to its joint, combined, and expeditionary potential, should have the ability to integrate modularly with other forces—namely as part of a NATO "response force" or a European Union "battle group"—to fulfill international obligations. One assumes that such a force would receive direction from an adequate command-and-control system and have "plug and play" capabilities for conducting operations in conjunction with other allied assets. Additionally, this force structure could carry out independent operations, such as rescuing and recovering citizens, as well as aiding in natural disasters. One could justify the acquisition, sustainment, and development of the capabilities required to perform such missions on the grounds of the nation's need to have at its disposal a capable and credible air force—one with an internationally recognized capability judged by the dedication and tenacity with which it conducts operations. As is the case today, the success of the future air force will derive from the individual and collective value of its people. Thus, their recruitment and retention, initial training and professional military education, and motivation and professional values will continue to constitute fundamental pillars of the military force's effectiveness.

In conclusion, we foresee an eminently expeditionary air force, which implies a high degree of interoperability with other national and multinational forces; an ability to function modularly, including a deployable command-and-control system suited to a specific operational environment; agile logistical support; a high capacity to explore the potential inherent in joint and combined operations; a structure that facilitates rapid response; and the use of weapon systems and equipment compatible with new technologies. In sum, such an air force could act effectively yet affordably in independent, joint, and combined operations. With its personnel not only solidly rooted in sound principles, values, and ethics, but also adequately educated and trained as well as professionally fulfilled, the air force of the future will continue to participate actively in Portugal's security and defense—and in its presence and affirmation in the world. ❑

Origins of the Royal Bahraini Air Force

Col Hamad Abdulla Al-Khalifa, Commander, Royal Bahraini Air Force

ALTHOUGH THE KINGDOM of Bahrain is a small country geographically, several characteristics have allowed it to become one of the more progressive nations in the Middle East and Asia. Due to its unique location and industrial status, many banks and international corporations decided to make Bahrain the center of their Middle East operations. In addition the country also processes natural resources such as oil and natural gas and hosts industrial operations, which include a petrochemical plant, an aluminum factory, a dry-dock site for ship maintenance, and oil refineries. Furthermore, Bahraini citizens—the country's human resource—are well versed in all of the professions associated with these activities and are capable of protecting the country's resources and preserving its freedom. A dedicated and capable military force composed of Bahrain's own citizens ensures the safeguarding of those assets and the defense of the country.

The Bahraini Defense Force, established in 1968, includes modern air force, infantry, and naval forces. Taking a first step toward developing itself, the Royal Bahraini Air Force sent many of its personnel to friendly countries in 1974 to receive training in aviation and aircraft maintenance. At the same time it procured jets, the Air Force purchased support equipment and other necessary materiel. When this materiel began arriving in Bahrain, the air and maintenance crews were completing their training courses abroad. These events successfully concluded the first stage in establishing the Air Force, and many other developments soon followed.

In 1976 the Air Force established an Air Wing at Rifa'a Air Base (see fig.) with a modest flight of four German-made Bo-105 helicopters.[1] Operations soon began, and because of Bahrain's location, these aircraft became critical to many successful search-and-rescue missions. In 1978, 12 Agusta Bell AB-212 Twin Huey helicopters became part of the Air Wing. Since the pilots and technicians were already qualified and prepared to operate these aircraft, operations commenced as soon as the crews joined the wing. These helicopters joined with platforms from neighboring countries and other friendly forces in several local and regional search-and-rescue operations as well as training exercises, including the rescue of a number of US Navy personnel after a missile attack on the USS *Stark* during the Iraq-Iran War.

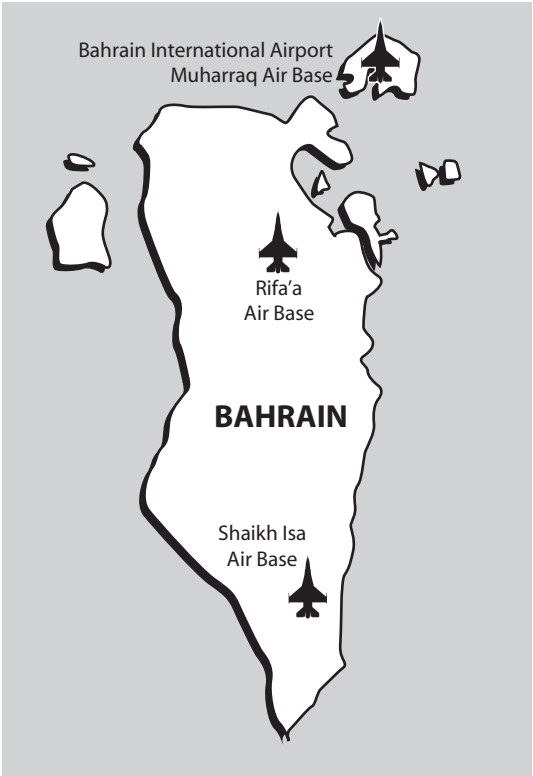

Figure. Location of Royal Bahraini Air Force bases

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Fighter Jets

During the development of the Defense Force and the introduction of several modern weapons systems, Bahraini officials recognized the importance of possessing fighter jets capable of defending the country's airspace. Consequently, in 1985 Bahrain acquired the F-5, the best export fighter jet available, and formed the 6th Fighter Squadron at Muharraq Air Base (see fig.). Bahraini pilots and technician crews underwent training concurrently and prepared to conduct operations when the jets arrived. This young force, initially called the Bahrain Amiri Air Force, conducted operations in helicopters and fighter jets and began construction of Shaikh Isa Air Base (see fig.), which would become one of the region's largest bases.[2] After pilots and technicians had mastered F-5 operations, training commenced on the F-16, an even more modern fighter aircraft. In 1990 the F-16s arrived, and Shaikh Isa Air Base opened in southern Bahrain. During the following year, these new Bahraini F-16s, alongside the F-5s, joined in the war to liberate Kuwait.

Training and Joint Exercises

Because of the fundamental role of training in the preparation of Royal Bahraini Air Force members to operate the modern systems they employ, the Royal Bahraini Air Force Technical Institute was created to offer instruction at all levels—from basic subjects to highly technical courses needed for specialized skills. The institute also offers courses to prepare officers and other members for educational opportunities abroad. For example, to further develop and prepare its future senior leadership, the Royal Bahraini Air Force selects several officers each year to attend specialized and advanced courses in the United States as part of the annual training plan. Some of those courses are offered by Air University's Squadron Officer School, Air Command and Staff College, and Air War College, located at Maxwell AFB, Alabama. Moreover, under the guidance and with the blessings of the Supreme Commander, His Majesty, the Air Force founded the Training Wing, which currently uses Firefly aircraft to provide instruction in basic aviation.[3] Advanced training will soon include the more sophisticated BAe Hawk trainer.[4]

Royal Bahraini Air Force F-16 aircraft

Because exercises lend a spirit of realism, reinforce integration throughout the various command levels, and play an important role in preparing for successful operations, Bahrain has emphasized participation in all training exercises with its neighbors and other friendly nations. Exercises such as Peninsula Hawk and Gulf Spears, conducted annually, involve forces belonging to members of the Gulf Cooperation Council (GCC), who share a sense of cooperation and common interests. Initial Link, another exercise in which Bahrain participates, helps organize and manage the air forces of the GCC, the United States, and other friendly nations. Additionally, Bahrain joins the US Air Force in Blue Flag, a command and control exercise held in the United States.

Attack Helicopters

Since Bahrain fields ground forces equipped with the most modern weapons and armored vehicles, it formed squadrons of AH-1 Cobra helicopters to provide direct and close air support for those forces.[5] Specifically, the year 1994 marked the establishment of the 8th Helicopter Squadron, followed in 1997 by creation of the 9th Helicopter Squadron, both units flying this important weapons system. Alongside the ground forces, the Cobras create a significant deterrent force.

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Air Defense Systems and the Air Operations and Air Defense Center

In 1999, due to the need for coordination between the Air Force and Air Defense Systems, the Air Defense Wing—consisting of HAWK Phase III missiles—fell under the umbrella of the Air Force.[6] The wing works in coordination with the various other Air Force wings to ably and efficiently secure the Kingdom's domain. Additionally, the availability of early-warning radars led to formation of the Air Operations and Air Defense Center, which connects the various Air Force sectors during air operations and maintains continuous coordination with operations centers belonging to neighboring and friendly forces.

Air Mobility

Due to the importance of air mobility, the BAe146-RJ85 aircraft became the foundation of the Mobility Wing of the Royal Bahraini Air Force.[7] Other mobility aircraft will join the wing's inventory in the near future.

Conclusion

Via these modest phases of development since the mid-1970s, the Royal Bahraini Air Force has become an effective force in the region. The loyal men of the Air Force exhibit the spirit of perseverance and determination to perform their national duty to protect Bahrain's cultural assets, which have accumulated through many years of nurture. Throughout this time, Bahrain has diligently worked on providing everything that would help its citizens realize their dreams of a free and abundant life and contribute to our Kingdom's honor and glory, while following the example of our highest role model, His Majesty King Hamad bin Isa Al-Khalifa, the King of Bahrain and Supreme Commander of the Defense Force. God save and protect him; he ignited the initial flame that formed this force. ❑

Notes

1. The Bo-105 is a twin-engine helicopter manufactured at the time by Messerchmitt-Bolkow-Blohm in West Germany. Forces all over the world still utilize it in medical evacuation, mainly because of its reliability, main rotor clearance of over nine feet, and tail rotor clearance of over seven feet. Its rear clamshell doors allow for easy loading and unloading.

2. The Royal Bahraini Air Force was formerly known as the Bahrain Amiri Air Force, but when Bahrain became a monarchy in the elections of 14 February 2002, the armed forces were renamed accordingly.

3. The US Air Force's Air Education and Training Command also uses the T-3A Firefly, a propeller-driven aircraft that replaced the T-41, to screen pilot candidates by exposing them to military-style traffic patterns, aerobatics, and spins.

4. In early 2003, Bahrain signed a deal for six BAe Hawk 127 two-seat jet trainers, manufactured by BAe Systems. The British Royal Air Force's Red Arrows Aerobatic Team has flown the Hawk family of aircraft since it entered service in 1976. Since then BAe Systems has built over 800 Hawk trainer and operational aircraft and has exported some of them to 15 countries.

5. The AH-1 Cobra evolved from the UH-1 Huey,

> originally developed for the US Army in the mid-sixties. The original Cobra retained the Huey's engine, transmission, and other major parts but replaced the Huey's bulky fuselage with a thin profile fuselage with tandem seating. . . . Primary missions of the Cobra are helicopter Close Air Support (CAS), escort of transport helicopters and ground convoys, armed reconnaissance, helicopter air-to-air attack, anti-shipping operations, and coordination and terminal control of fixed wing CAS, artillery, mortars, and naval gunfire. It is the only western attack helicopter with a proven air-to-air and anti-radar missile capability.

"AH-1 Cobra," *GlobalSecurity.org*, http://www.globalsecurity.org/military/systems/aircraft/ah-1.htm.

6. The Homing All the Way Killer (HAWK) surface-to-air missile system "provides medium-range, low to medium altitude air defense against a variety of targets, including jet and rotary wing aircraft, unmanned aerial vehicles, and cruise missiles." Its Phase III configuration also includes a defensive capability against tactical missiles. It is a highly lethal, mobile, all-weather, day-or-night system that is reliable and effective against electronic countermeasures. "HAWK," *GlobalSecurity.org*, http://www.globalsecurity.org/space/systems/hawk.htm.

7. The BAe146-RJ85 is normally used as a regional airliner, carrying 70–82 passengers.

Lt Col Paul D. Berg, USAF, Editor

Honoring a Fallen Airman and Introducing the Latest *Chronicles Online Journal* Articles

We begin this issue on a somber note. The editors of *Air and Space Power Journal* (*ASPJ*) were profoundly saddened to hear that Maj William Brian Downs, the author of a recent *ASPJ* article, has died. He, along with three other Americans and the Iraqi pilot he was instructing, perished in an aircraft crash 80 miles northeast of Baghdad, Iraq, on 30 May 2005. His article, "Unconventional Airpower," appeared in the spring 2005 issue of *ASPJ*. As a member of the 6th Special Operations Squadron, Major Downs was an expert at training other air forces to employ airpower to defend their countries against terrorists, insurgents, and other threats. His article offers keen insights into the doctrine, force structure, and tactics needed to counter the foes we face today. His personal experience and obvious dedication to duty bolstered the points he made in that article. America has lost an Airman, but his values and ideas live on. We are proud to note that his *ASPJ* article reflects one modest expression of those ideas. We hope that other Airmen gain inspiration from his life and wisdom from his writings. The *ASPJ* staff wishes to express our deepest sympathies to Major Downs's family.

A man of action, Major Downs noted in his article that "the war on terror and our efforts against insurgents will take a long time. The US Air Force must adapt itself for the fight" (p. 25). Airmen can help in this adaptation process by intellectually engaging in the discussion of airpower and space power ideas and issues that confront our service today, as well as those that will concern us in the future. *ASPJ* promotes that professional dialogue among Airmen worldwide. In that spirit, we commend his article to you and introduce the latest *Chronicles Online Journal* (*COJ*) articles.

COJ complements the printed editions of *ASPJ* but appears only in electronic form. Not subject to any fixed publication schedule, it can publish timely articles anytime. Furthermore, while *ASPJ* focuses narrowly on airpower and space power topics of concern to today's Air Force, *COJ* covers a broader range, including historical, political, or technical matters. It also includes articles too lengthy for inclusion in the printed journals.

Articles appearing in *COJ* are frequently republished elsewhere. The Spanish, Portuguese, and Arabic editions of *ASPJ*, for example, routinely translate and print them. Book editors from around the world select them as book chapters, and college professors use them in the classroom. Recent articles available at http://www.airpower.maxwell.af.mil/airchronicles/cc.html include

- Capt Craig S. Miller's "A New Perspective for the Military: Looking at Maps within Centralized Command and Control Systems" and
- Maj Tadd Sholtis's "Planning for Legitimacy: A Joint Operational Approach to Public Affairs."

The *ASPJ* editorial staff is always seeking insightful articles and book reviews. We offer publication opportunities in English, Spanish, Portuguese, and Arabic. We will add a French version of *ASPJ* in the near future. To submit an article for publication in any of these languages, please refer to the submission guidelines at http://www.airpower.maxwell.af.mil/airchronicles/howto1.html. We publish book reviews to inform Airmen about the latest books published on military topics. To submit a book review, please refer to the guidelines at http://www.airpower.maxwell.af.mil/airchronicles/bookrev/bkrevguide.html. ❑

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Ricochets and Replies

We encourage you to send us your comments, preferably via e-mail to aspj@maxwell.af.mil. You may also send letters to The Editor, Air and Space Power Journal, *401 Chennault Circle, Maxwell AFB AL 36112-6428. We reserve the right to edit the material for overall length.*

ARABIC *ASPJ*

We thank the editor and staff [of the new Arabic *ASPJ*], with special thanks to 1st Lt Basma Abdul-Hamid for this great effort. All the topics are meaningful and constructive. I enjoyed the article about the strategic perspective on fighting terrorism ("What Kind of War? Strategic Perspectives on the War on Terror") by Col John D. Jogerst. My regards to your efforts, and God bless you.

Brig Gen Qaid Al-Khuzaa'i
Director of Operations, Iraqi Air Force
Baghdad, Iraq

Editor's Note: See the inside back cover of this issue for a photograph of General Al-Khuzaa'i receiving a copy of the inaugural ASPJ-*Arabic in Baghdad in February 2005. The Arabic version of Colonel Jogerst's article first appeared in the spring 2005 issue of* ASPJ-*Arabic, available at http://www.airpower.maxwell.af.mil/apjinternational/aspjarabic/2005/spr05/jogerst.pdf. We subsequently republished that article in the spring 2005 issue of* ASPJ-*English, available at http://www.airpower.maxwell.af.mil/airchronicles/apj/apj05/spr05/jogerst.html.*

Congratulations on standing up the Arabic *ASPJ*. That's a great accomplishment. Hopefully it will help cement our valuable relationship with that part of the world.

Maj Matt "Knocker" Isler, USAF
Nellis AFB, Nevada

LEADERSHIP

Congratulations on your leading article—"Lorenz on Leadership" by Maj Gen Stephen R. Lorenz (summer 2005, available at http://www.airpower.maxwell.af.mil/airchronicles/apj/apj05/sum05/lorenz.html). It is a truly insightful and inspirational document. I cannot remember reading a better written or more useful article on that topic. I have forwarded it to junior Air Force officers who will need those words of wisdom throughout their careers, and I have recommended that they keep a copy handy for frequent reference. Thank you for your exceptional publications. They help me keep my brain active.

Col Robert E. Frank, USAF, Retired
Henderson, Nevada

RESCUE OPERATIONS

I was a member of Task Force Gabriel, one of the aviation units mentioned in Col Darrel Whitcomb's article "Rescue Operations in the Second Gulf War" (spring 2005, available at http://www.airpower.maxwell.af.mil/airchronicles/apj/apj05/spr05/whitcomb.html). I authored one of the documents he cites in his sources (AWOAC Historical Case Study: "Personnel Recovery Operations during OIF"). I just wanted to say well done! The article is very well put together.

CWO3 Gordon Cimoli, USA
Giebelstadt, Germany

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Lt Col Paul D. Berg, USAF, Editor

Coalition Perspectives on Airpower and Space Power

ALLIANCE AND COALITION military operations figure prominently in both war and peace. Alliances such as the North Atlantic Treaty Organization (NATO) are formal, usually long-term strategic partnerships codified in written accords. Alliance agreements normally obligate signatories to render substantial military, political, and economic support to one another. Coalitions are less formal than alliances, typically consisting of countries or other political groups acting in concert to pursue selected common goals on an ad hoc basis. Coalition members may contribute to only a single aspect of an operation, remain in the coalition temporarily, and feel free to limit the extent of their obligation to other members. For example, the coalition formed to conduct Operation Enduring Freedom featured members who provided varying forms of political, logistical, or military support. A different coalition participates in Operation Iraqi Freedom. Yet another took part in Operation Unified Assistance—the tsunami-relief effort of early 2005. Terms like *coalition of the willing* have entered our vocabulary to describe countries joining together for specific purposes but not forming broad, enduring political relationships. Some pundits question the future of traditional military alliances such as NATO, but few of them doubt the ongoing importance of coalitions.

From an Airman's perspective, airpower and space power operations conducted by alliances and coalitions present somewhat different challenges. Alliance members usually have time to train together to refine doctrine and optimize interoperability. They may even standardize equipment to some degree. Conversely, coalitions bring together air forces that may have minimal prior experience working together. The event that triggers coalition formation may be a war or natural disaster, so Airmen from participating nations need to reach agreement on key operating procedures as soon as possible. The success of Unified Assistance showed that preparation and planning before an emergency can pay dividends. The Multinational Planning Augmentation Team (MPAT), "a cadre of military planners from nations with Asia-Pacific interests capable of rapidly augmenting a multinational force headquarters established to plan and execute coalition operations in response to military operations other than war/small scale contingencies," offers a good example.* Disaster-response agreements that MPAT members had reached long before the tsunami struck in December 2004 helped coalition members work together to deliver relief to stricken people more quickly than might otherwise have been possible.

Each unique coalition member deserves understanding and respect. Some bring impressive military capabilities. Others contribute more modest resources, such as logistical support or basing rights. However, all participants significantly bolster the effort's political legitimacy, as seen by the world community. Airmen from different countries need to understand the ever-changing constraints faced by their coalition partners and value the contributions they make.

*Briefing, subject: Multinational Planning Augmentation Team, 1 June 2005, PowerPoint slide 3, http://www2.apan-info.net/mpat/main-files/What%20is%20MPAT_files/frame.htm (accessed 11 June 2005).

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Because we cannot predict the next crisis in today's uncertain world, Airmen should educate themselves about the perspectives of potential coalition partners. In some cases, such as the British-American relationship, Airmen from different countries have long trained and served together, but other air forces are less acquainted with one another. Each of the world's air forces faces unique challenges and operates different equipment, but Airmen everywhere can profit from exchanging views about how best to apply airpower and space power in pursuit of common goals. To foster such an exchange, this issue of *Air and Space Power Journal* contains articles written by authors from Argentina, Australia, Bahrain, Brazil, Germany, Portugal, Singapore, and the United States. In hope of supporting future coalition operations, we dedicate this issue to advancing professional dialogue and mutual understanding among all the world's Airmen. ❑

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(Fall 2004)

Congratulations to this year's winners! The award honors airpower pioneer Gen Ira C. Eaker and is made possible through the generous support of the Air University Foundation. If you would like to compete for the Ira C. Eaker Award, submit a feature-length article to the Editor, *Air and Space Power Journal*, 401 Chennault Circle, Maxwell AFB AL 36112-6428 or via e-mail at aspj@maxwell.af.mil. All military personnel below the rank of colonel (O-6) or government civilian employees below GS-15 or equivalent are eligible. If *ASPJ* publishes your article, you will automatically be entered in the competition.

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We are committed to expanding international cooperation in the reconstruction and security of Iraq, just as we are in Afghanistan.

—Pres. George W. Bush

Centralized Execution in the Air Force

Maj John Schaefer III, USAF*

Two weeks into the war, you are on your way north into Iraq leading a two-ship of F-15Es, each loaded with eight GBU-12s and a GBU-10. It's a clear, blue day, and your onboard sensors give you a good fix on a convoy of Iraqi trucks stalled on the road with heavy loads. But then the Airborne Warning and Control System aircraft interrupts your perfect sortie:

"Tipsy 07, this is Darkstar."
"Darkstar, this is Tipsy 07. Go ahead."
"Tipsy 07, Kmart directs you to proceed to X and destroy Y."

Since the rules of engagement (ROE) specifically prohibit destroying Y, you make sure the tape is on before authenticating Darkstar and making him repeat the order. He confirms the order, emphasizing that it comes directly from Kmart—the joint force air and space component commander (JFACC)—and that it is time sensitive. You inform Darkstar that this mission will require you to divert and dutifully lead your two-ship to X and turn Y into piles of flaming wreckage. After hot-pit refueling at your divert base, you and your weapon systems officer fly home wondering if maintenance will be able to deliver enough jets for tonight's sorties, considering your late return; you also discuss the merits of centralized execution of airpower. Meanwhile Kmart celebrates the crippling blow your sortie delivered to the Iraqi leadership.

The Master Tenet

Although advances in command-and-control technology have made centralized execution both feasible and appropriate in certain limited circumstances, one should carefully follow the guidelines laid out in Air Force Doctrine Document (AFDD) 1, *Air Force Basic Doctrine*, which defines centralized control as "the planning, direction, prioritization, synchronization, integration, and deconfliction of air and space capabilities to achieve the objectives of the joint force commander." That document also describes de-

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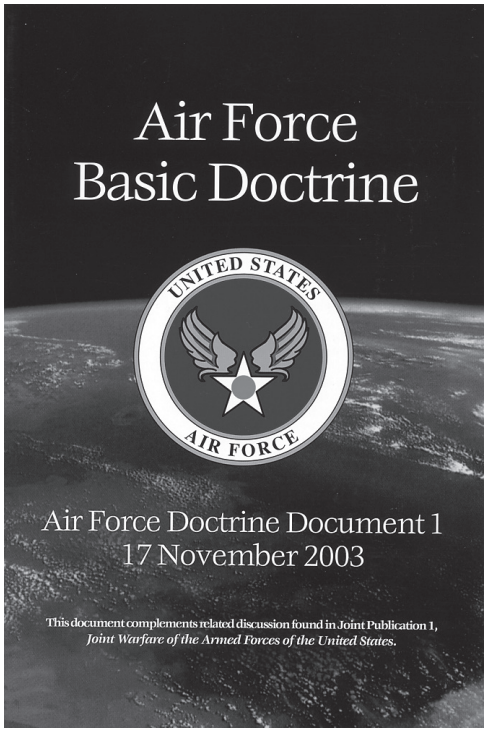

centralized execution as "the delegation of execution authority to responsible and capable lower-level commanders to achieve effective span of control and to foster disciplined initiative, situational responsiveness, and tactical flexibility."[1] The airpower tenet of centralized control and decentralized execution arose when available technology did not allow commanders to see what their airpower assets were doing in real time. Specifically, the lack of reliable communications limited the direct control of those assets. The Air Force embraced decentralized execution partially in reaction to heavy losses suffered during the Vietnam War, when individuals outside the theater controlled planning and execution. Aircrews had to use tactics ill suited to the threat, resulting in reduced effectiveness and unnecessary losses. Information flowed slowly to and from the theater, and the means of communication dictated transmission of only the most important data. Technology available at the time did not provide the fidelity required for successful centralized execution.

Current technology, however, provides commanders with real-time information about all their assets and high-quality intelligence about the enemy's assets. Our ability to collect and disseminate data continues to grow exponentially. As the introductory scenario illustrates, this growth has led to instances of commanders easily reaching forward and successfully employing centralized execution. Since this phenomenon has already occurred and the temptation to utilize it will only grow as our assets and weapons connect to the global information grid, an examination of centralized execution seems appropriate.

Centralized or Decentralized Execution?

According to Lt Col Woody Parramore, USAF, retired, "Centralized execution happens if a sortie carries out its mission under direct control of an air and space operations center (AOC) (whether a theater AOC, the tanker airlift control center, or the space AOC), with no other echelon in the chain of command issuing orders."[2] Armed with this definition, we can examine

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AFDD 1's reasons for employing decentralized execution, situations that may call for centralized execution, and guidelines for using centralized execution. AFDD 1 addresses decentralized execution's ability to "achieve effective span of control" by pointing out that modern technology brings the commander a flood of data far greater than he or she can absorb and translate into situational awareness. No commander can know everything about every asset in a complex theater with hundreds of players. This argument sets a boundary for the extent to which one should use centralized execution but does not preclude it. Commanders should remain focused on higher-level issues and avoid delving into tactical details. Small operations make centralized execution even more tempting, but commanders can assure the routine achievement of greater effects by letting highly skilled Airmen execute their assigned duties while airborne.

In both small and large air campaigns, the challenge lies in identifying sorties that lend themselves to centralized execution. The JFACC should have a system or staff, such as a time-sensitive targeting cell, in place that recognizes those rare instances as they occur and knows their limitations in using centralized execution to meet the commander's intent. When personnel or equipment issues cause centralized execution to tie up assets that could produce better effects by allowing the theater air control system (TACS) to run its course, one should avoid centralized execution.[3] If an input into the TACS can produce a desired effect, then one doesn't need centralized execution. For instance, if the ground commander decides to make killing a particular enemy armored division the priority for the next week, then the JFACC should make appropriate inputs into the TACS to generate air tasking orders that will accomplish this goal. Attempting to reach forward and individually redirect the number of sorties required to achieve this effect is not the preferred option.

AFDD 1 also notes that decentralized execution serves to "foster disciplined initiative." When properly used, centralized execution redirects a sortie's effort but should not take all initiative away from the aircrew. Our entire system of training seeks to develop aircrews that can take stock of the existing tactical situation and execute their mission. Centralized execution that removes the ability to adjust to real-world conditions amounts to micromanagement and is counterproductive. For instance, transmitting exact attack parameters for a new target instead of assigning the target with a run-in restriction to avoid overflight of a particular area may result in the aircrew's not having the flexibility to employ due to such real-world conditions as bad weather in the target area. When employed properly, centralized execution does not restrict aircrew initiative any more than publishing a change to the ROE would.

Current and emerging technologies require reevaluation of AFDD 1's statement that decentralized execution improves "situational responsiveness." In previous conflicts, oftentimes only aircrews saw the tactical situation and the true lay of the aerial battlefield. Commanders relied on after-action reports and reconnaissance assets, usually with long delays, to shape their picture of the battlespace. Modern surveillance and communications assets have

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significantly improved battlespace awareness. The situation now dictates who has a better view of events on the battlefield. In some cases, control elements located with or above friendly surface forces, such as ground or airborne forward air controllers, may have a much more accurate picture of action on the ground than the AOC does. On the other hand, weather, threats, and lighting conditions may degrade the control element's situational awareness so severely that one finds much better real-time situational awareness on the AOC floor. In a perfect world, the control element would pull the same information off the global information grid that the AOC sees, but current avionics limitations and the demands of flying and surviving in a hostile environment sometimes inhibit this process. Because of longer sortie durations and limited data pipelines to the cockpit, the information that aircrews have on takeoff can lose currency by the time they reach their target areas. Thus, centralized execution might offer the only way of capitalizing on emerging information and quickly responding to the changing situation on the battlefield.

Finally, although AFDD 1 declares that decentralized execution fosters "tactical flexibility," it does concede that "in some situations, there may be valid reasons for execution of specific operations at higher levels, most notably when the JFC [joint force commander] (or perhaps even higher authorities) may wish to control strategic effects, even at the sacrifice of tactical efficiency."[4] One can justify losing some incremental tactical progress toward the commander's intent provided by decentralized execution when centralized execution will spur significant movement toward strategic objectives. Additionally, political constraints may force a commander to employ centralized execution. For example, during the Cuban missile crisis, President Kennedy exercised strong personal control of low-level activities to avoid blundering into a nuclear war.[5]

The Road Ahead

In his article "Centralized Control/Decentralized Execution in the Era of Forward Reach," Maj Mark Davis argues for modifying the decentralized-execution portion of the master airpower tenet in order to align Air Force and joint doctrine.[6] Since World War II, however, this master tenet has repeatedly proven itself as the best way to employ airpower. Ignoring it can lead to compromising the remaining tenets of airpower and to losing effects. Overuse of centralized execution shackles the flexibility that allows trained Airmen to achieve airpower's maximum effects. Nonetheless, recent events have shown that centralized execution will occur. However, the unique characteristics of airpower and space power dictate that decentralized execution remain the norm. Although Air Force doctrine acknowledges that commanders may use centralized execution, it does not provide in-depth analysis of the inherent trade-offs. An examination of the Air Force's reasons for employing decentralized execution reveals some practical guidelines for using centralized execution.

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The Effects

One must first consider whether any benefits would accrue to tactical, operational, or strategic effects from employing centralized rather than decentralized execution. One can justify some loss of effectiveness or efficiency at a lower level in exchange for gains at a higher level. For example, centralized execution might prove appropriate for redirecting sorties to deliver a fatal blow to enemy command-and-control systems, preventing the spread of a conflict over political borders, attacking time-sensitive targets, or complying with political constraints at the direction of civilian leadership. One should not use centralized execution simply to exchange one tactical effect for another—something best accomplished by changing guidance to the decentralized system. The AOC staff must recognize that "because we can" does not qualify as justification for switching to a centralized-execution mode. Similarly, the JFACC should not habitually use centralized execution simply because the capability exists but should do so only when its increased effects justify deviating from the master tenet.

Who's in Charge?

Given the employment of centralized execution, the JFACC must remain the single air commander, responsible for ensuring that such execution does not degrade effectiveness by leading to the de facto establishment of private air forces at the disposal of supported ground commanders. AFDD 1 clearly states that the JFACC should "mediate the competing demands for tactical support against the strategic and operational requirements of the conflict."[7] This responsibility remains the JFACC's even if that commander chooses, based on his or her expertise as an Airman, to employ centralized execution to support the ground commander. In order to maximize its effects, airpower should remain under the command of an Airman, regardless of the method of execution selected by the JFACC.

The Right People at the AOC

Because centralized execution adds to the responsibility of the AOC, it must be staffed with experienced war fighters. Sending the squadron's youngest four-ship flight lead or a field grader fresh off the staff but not yet back on his or her game to the AOC will not work with centralized execution. The recent effort to treat AOCs as weapon systems has paid great dividends in standardizing and upgrading their equipment. Since this new equipment has made limited centralized execution a reality, AOCs must put it in the hands of current, tactically proficient Airmen who can recognize when such execution represents the best way of fulfilling the commander's intent.

Making Up for Pipeline Shortfalls

One can use centralized execution to overcome shortfalls in existing information pipelines. Because AOCs often have access to more information

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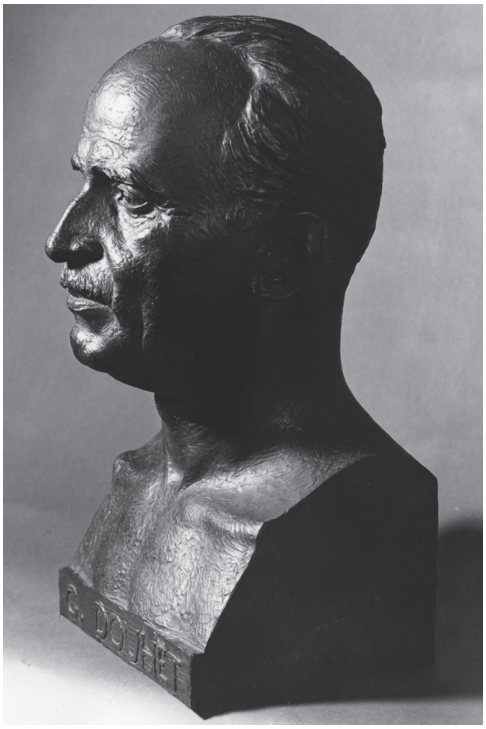
than do aircrews in the cockpit, they can use the additional data to reach forward and centrally execute sorties when pipeline shortfalls prevent crews from obtaining information in a timely fashion. The long-term fix would entail increasing the size of the pipelines to the cockpit and enhancing the quality of the information so that aircrews can subscribe to the types of data they need. In the meantime, an accurate picture of the theater-information architecture will help identify situations in which physical or network limitations prevent maximum effectiveness when assets operate under decentralized execution. The JFACC and his or her staff need to know about such limitations so they can use centralized execution to push forward information that can radically alter a sortie's effectiveness.



Giulio Douhet

Training for Decentralized Execution

Our current system of training produces Airmen who can gather information from multiple sources and make the right decisions in the air during the heat of battle—a great source of strength for the Air Force. Our service will always need individuals capable of flexibly employing their weapon systems. Thus, the Air Force needs to ensure that the incorporation of limited centralized execution does not eventually produce a force of Airmen unable to act on their own.

Deviate with Caution

Central execution of a sortie should not create an airborne puppet. The AOC must still honor the remaining tenets and principles of airpower, leaving the aircrew enough flexibility to achieve the desired effect. AFDD 1 addresses this issue: "Centralized control maximizes the flexibility and effectiveness of air and space power; however, it must not become a recipe for micromanagement, stifling the initiative subordinates need to deal with combat's inevitable uncertainties."[8] This statement also applies to properly employed centralized execution. Similarly, the AOC should keep the overall situation in mind to avoid losing the effects of numerous sorties when the

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centralized execution of a few sorties results in failure to achieve sufficient mass. Limited use of centralized execution will allow the JFACC to capitalize on technology yet still realize maximum effects by adhering to the remaining tenets of airpower. Indeed, according to AFDD 1, "Commanders must apply their professional judgment and experience to the principles and tenets as they employ air and space power in a given situation."[9] This balancing act currently includes the use of centralized execution, whose employment should become easier as technology advances.

The Air Force should take to heart Giulio Douhet's observation that "victory smiles upon those who anticipate the changes in the character of war, not upon those who wait to adapt themselves after the changes occur."[10] Because technological progress increases the likelihood of utilizing limited centralized execution, the Air Force needs to anticipate the attendant changes and incorporate them into its doctrine, training, and operations. ❑

Fort Leavenworth, Kansas

Notes

1. Air Force Doctrine Document (AFDD) 1, *Air Force Basic Doctrine*, 17 November 2003, 28, https://www.doctrine.af.mil/Main.asp?.
2. Lt Col Woody W. Parramore, USAF, retired, "Defining Decentralized Execution in Order to Recognize Centralized Execution," *Air and Space Power Journal* 18, no. 3 (Fall 2004): 25, http://www.airpower.maxwell.af.mil/airchronicles/apj/apj04/fal04/fal04.pdf.
3. According to Air Force Instruction (AFI) 13-1AOCV3, *Operational Procedures—Aerospace Operations Center*, 1 July 2002, http://www.e-publishing.af.mil/pubfiles/af/13/afi13-1aocv3/afi13-1aocv3.pdf, the TACS "consists of mobile facilities, equipment and trained personnel to permit tailored C2 for aerospace operations throughout the spectrum of conflict" (7). See chap. 2 of this AFI for a detailed overview of the TACS.
4. AFDD 1, *Air Force Basic Doctrine*, 30.
5. Lt Col Phillip K. Heacock, "The Viability of Centralized Command and Control (C^2)," *Air University Review* 30, no. 2 (January–February 1979), http://www.airpower.maxwell.af.mil/airchronicles/aureview/1979/jan-feb/heacock.html.
6. Maj Mark G. Davis, "Centralized Control/Decentralized Execution in the Era of Forward Reach," *Joint Force Quarterly*, Summer 2003, http://www.dtic.mil/doctrine/jel/jfq_pubs/1835.pdf.
7. AFDD 1, *Air Force Basic Doctrine*, 28.
8. Ibid.
9. Ibid., 27.
10. Giulio Douhet, *The Command of the Air*, trans. Dino Ferrari (1942; new imprint, Washington, DC: Office of Air Force History, 1983), 30.

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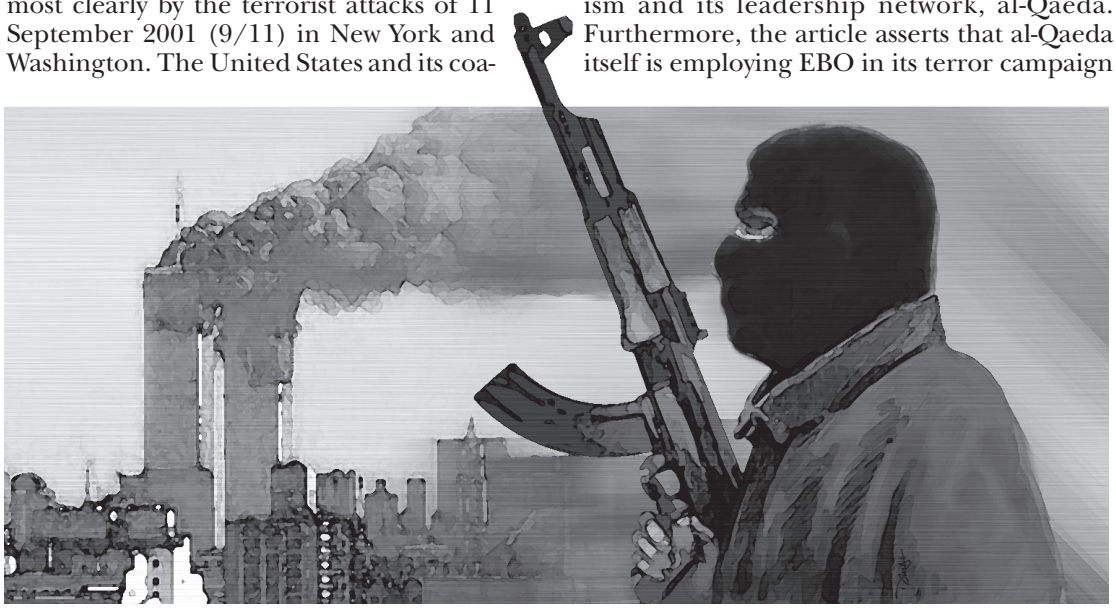
Effects-Based Operations and Counterterrorism

Mr. David B. Lazarus

Editorial Abstract: Mr. Lazarus offers an Australian view of the concepts, philosophies, and relevance of effects-based operations (EBO) in the fight against terrorism. He contends that al-Qaeda's actions can be understood through an EBO lens and concludes that the only effective response is to employ a higher-level effects-based strategy (EBS). To be successful, EBS will have to overcome the challenges of Muslim distrust and the changing strategies associated with short-lived Western democratic political administrations.

DEVELOPMENTS AND CRISES across the globe over the last decade have demonstrated the significant security challenges that many nations have been experiencing during a transition from Cold War to post–Cold War security structures and approaches. Arguably the single greatest challenge posed within this new international system is the threat of modern terrorism. The danger of this threat was demonstrated most clearly by the terrorist attacks of 11 September 2001 (9/11) in New York and Washington. The United States and its coalition partners are currently experiencing the magnitude of this challenge in their global campaign against international terrorism.

This article will attempt to examine the relevance of the new concepts and capabilities of effects-based operations (EBO) in the fight against international terrorism. To do so, one must explore the philosophy of the effects-based approach with specific reference to the current phenomenon of radical Islamic terrorism and its leadership network, al-Qaeda. Furthermore, the article asserts that al-Qaeda itself is employing EBO in its terror campaign



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and that the only effective response must inherently involve a larger and higher-level effects-based strategy (EBS) by the United States and its allies.

The degree to which air and space power capabilities are relevant to the concepts of EBO and EBS will not be examined to any great degree. This does not reflect any judgement as to their actual, undeniable centrality to the concepts, but rather the fact that any such examination may be counterproductive to reaching a clear understanding of the more fundamental principle of the effects-based philosophy—all that matters is what is achieved, not how it is achieved.

Effects-Based Operations and Strategy

EBO is defined as a conceptual process "for obtaining a desired strategic outcome or 'effect' on the enemy, through the synergistic, multiplicative, and cumulative application of the full range of military and nonmilitary capabilities."[1] This is an adaptive process that takes the shape of a complex, interwoven pattern that spans the tactical, operational, and strategic dimensions of engagement.[2] The enabling foundation of EBO is effects-based targeting, which involves creating and manipulating events using precision lethal and nonlethal capabilities that change an adversary's behaviour and mind-set in a manner close to that which was originally intended.[3]

The planning process undertaken occurs predominantly at an operational level.[4] It consists of an initial attempt to map forward in time the linkages of controllable actions and the relationship between their likely effects and the predefined objectives that drive the process. While this process preferably begins long before any EBO is launched, it is organic, evolutionary, and continuous, employing near-simultaneous planning that is coordinated across all echelons of command.[5] This is a result of the necessity to account for secondary-, tertiary-, and greater-order effects that flow on from the original event like ripples across a pond, hopefully achieving the ultimately desired effect.[6] While this is generally true of all combat, the exceptional sensitivity of EBO to this dynamic is of a far greater order and magnitude.

Whether this final effect in the end is really what was wanted and satisfies the predefined objective can only be judged at a later point in time, and from a strategic rather than a tactical or an operational perspective. Hence, the essence of EBO is its focus upon the outcome of any operation rather than how the operation is conducted. Furthermore, since the ultimate sourcing of EBO objectives is from the strategic or political level, this leads directly to the conceptual heart of strategy—that war itself is simply an extension of politics by other means.[7]

This implies the necessity for political guidance toward some sort of strategic framework within which effects-based planning must be undertaken. This inference leads to the concept of EBO, which can be defined as the coherent application of all national resources on all national levels, guided by ends rather than by means or ways, in order to achieve grand strategic objectives.[8] The significance of EBO in this strategic context is that it provides the imaginative leaders of advanced nations the capacity to truly target an adversary in a manner that can enable the achievement of the ultimate goal of skillful strategy—to subdue the enemy without fighting.

The Nature and Strategy of International Terrorism

The profound implications of the effectiveness of EBO and EBS with respect to modern conventional warfare have been demonstrated through the astounding conventional coalition victory during the initial occupation stage of the recent Iraq War in 2003.[9] The war itself was described as an effects-based campaign by the US military, termed *shock and awe*, and embodied the most meaningful attempt in recent times at employing armed conflict in order to achieve a strategic outcome through the effects produced by military force.[10]

Only time will ultimately tell whether this was in fact a successful attempt. While military

victory was arguably inevitable, far less predictable is the actual desired strategic outcome of a safe and stable self-determined Iraqi government—one that honours human dignity and serves as a beacon for democracy in the Middle East. Yet the global debate that raged in the lead-up to that war, which has continued even more so since its seemingly incorrectly touted conclusion, concerns the relevance not only of the war in Iraq to the current global war against terrorism, but of war itself and any military response to the threat of international terrorism.[11]

At issue seems to be the unwillingness or inability of many to conceive of warfare as something beyond the purely physical, destructive, force-on-force exercise that has until now been the nature of warfare. The ability to out-manoeuvre an adversary and apply an exceptional rate of battlefield attrition is indeed almost entirely useless and irrelevant when it comes to an ideologically driven global terror network such as al-Qaeda. However, the effects-based concept is not reliant on such physically limited means.[12] At its fundamental core, EBO is about the mind perceptions and the cognitive dimensions of an adversary's reality, regardless of any physical or military inferiority or superiority.[13] Al-Qaeda is employing EBO in its campaign of terror and has in fact arguably undertaken one of the most visible, high-profile EBOs in history—9/11. Axiomatically, the degree to which 9/11 can be judged a success or failure from al-Qaeda's point of view can only be determined with the passing of time.

Shock and Awe

In terms of shock and awe, no aspect of the recent coalition campaign in Iraq can even begin to compare to the psychologically and cognitively devastating effects of the terrorist attacks on New York and Washington in 2001, particularly of course for Americans.[14] These attacks unquestionably set apart al-Qaeda from all other terrorist groups through its demonstrated ability to comprehend and plan for the dynamics of temporally grouped crisis events whose constructed linkages produced an emotional terror which far exceeded the sum of the individual acts themselves.[15] The timing of the attacks to coincide with a peak window of the global media cycle is further evidence of the attention paid to the wider cognitive and informational effects intended to result from the attacks, rather than any simple physical destruction.[16]

Without further dissecting the attacks of 9/11, it should be sufficient to assert that al-Qaeda leader Osama bin Laden and his terrorist planners are not simply madmen but are highly intelligent, imaginative, resourceful, and insightful individuals who clearly understand the fundamentally psychological and emotional nature of their own battlespace.[17] The events of 9/11 also clearly demonstrated their ability to conceptualise the second- and third-order capacity of effects that could result from their attacks.[18] While the exact goals and specific motivations of bin Laden are now the intense focus of a great many analysts and commentators, a clearly enunciated aim has long been the elimination of Westerners and the US military presence in Saudi Arabia. Worth noting is the fact that the US response to the terror attacks has indeed been to withdraw its military presence.

The Global War on Terror

As mentioned previously, the mere assertion that any effective response to the threat of international terrorism can take the form of something akin to a war employing military means sparks intense debate.[19] This article does not intend to examine in any great depth the conduct of the war against terrorism up to this point, but some comment is perhaps necessary and relevant to set the tone for the discussion that will follow. It must be noted that—immediately following 9/11—the United States clearly and correctly acknowledged that the nature of the war to be undertaken would be unlike anything previously seen or conceived and that beyond its physical effects, much would be unseen and unknown.[20] This hinted perhaps at recognition of the need for

a focus on the cognitive and informational dimension of their enemy.

Furthermore, in response to the need for immediate mobilisation, the US campaigns first in Afghanistan and then in Iraq had to make do with then-current capabilities that had previously been designed for and suited to traditional, conventional military adversaries.[21] New and rapidly evolving capabilities were indeed employed and guided by effects-based concepts, but these too were based on mostly traditional military platforms, such as the B-52 bomber.

The point to be made is that the campaigns were always going to look very traditional in much of their physical conduct. However, there was a significant application and evolution of effects-based thinking even between the wars in Afghanistan and Iraq.[22] This indicates that judging the US-led war on terrorism as fundamentally flawed by an emphasis on trying to defeat the enemy on a redundant battlefield perhaps overlooks the profound revolution in strategic military thought that is currently under way, based broadly around the effects-based philosophy.[23]

The Threat of Rogue Nations

While the significance of the terrorist threat posed by a traditional nation-state such as Iraq is obviously a contentious issue, the threat does indeed exist in the form of two specific scenarios: (1) the provision of safe havens to terrorist networks and (2) their possible access to weapons of mass destruction (WMD).[24] The first such scenario does not require much elaboration since it was clearly and easily understood in the case of Afghanistan that denying al-Qaeda a territorial base of operations from which it can devise and launch operations is a fundamental prerequisite to undermining and eliminating the terrorist threat that it poses.

In relation to Iraq, however, the second scenario regarding possible terrorist access to WMD is now condemned as a fallacy that undermines any possible legitimacy for launching the war in the first place. But the significance of EBO in the war on Iraq that followed was profound, regardless of whether or not Iraq did in fact present a source of WMD capability to al-Qaeda.[25] The Iraq War clearly demonstrated the changed paradigm from old war to new—from former military objectives of exhaustion and attrition to the more direct achievement of regime change, network targeting, and territorial control utilising a far smaller scale of force and involving far less direct ground combat. EBO enabled the direct targeting of Iraq's centre of gravity—its leadership. US commanders also demonstrated the possibility of using their asymmetrically superior military capability in a measured, tailored manner in order to organise Iraqi options in such a way as to cognitively herd them toward the inevitable achievement of coalition objectives.[26]

Targeting the International Terrorist Network

The series of terror attacks that have occurred in the aftermath of the Iraq War, however, have been a sobering reminder that the central focus of the current war against terrorism must remain on the al-Qaeda network. The most notable of these attacks included the bombings of the UN headquarters in Iraq in late 2003 and the Madrid train station in early 2004. From an EBO perspective, the challenges of targeting not a national leader but a globally dispersed network that is religiously and ideologically driven are profound.[27]

Al-Qaeda truly represents the next generation of networkcentric adversaries, leveraging its own asymmetric advantage in employing its own objective-driven EBO.[28] Al-Qaeda is an enemy that hides in the cultural and political shadows of the world and strikes suddenly at the economic, political, and cultural centres of power of its enemy before fading back into the shadows and quietly assessing the results in terms of its overall strategy.[29] The difficulties in targeting such a foe are numerous.

From a defensive standpoint, the most powerful weapon available in the struggle to prevent terrorist attacks themselves and dismantle the networks behind them is intelligence.[30] Collaboration between intelligence agencies,

local police, and security services around the world is certainly the most effective approach to locating, monitoring, disrupting, and destroying localised al-Qaeda cells and radical Islamic groups.[31] But the success of such an effort will always be limited to the tactical and operational levels. In order to effectively counter terrorism at the strategic level, it is necessary to target and disrupt the strategic guidance provided by the political leadership of al-Qaeda to its dispersed and otherwise independently operating cells.[32] The planning and conduct of an EBO such as the terrorist attack in Madrid, where the intended strategic effect certainly had nothing to do with Spain itself but with the attempt to undermine the coalition effort in Iraq, require planners to know the intentions of al-Qaeda leadership.[33]

The ability of al-Qaeda to communicate its intent to operational-level leaders of the network must be the target of the intelligence-gathering effort, whether focusing on conventional communications, use of the Internet, audio- and videotapes released to the media by al-Qaeda leaders, or even through more creative means. However, as demonstrated by Israel's battle against Palestinian terrorists, no amount of intelligence gathering or security measures can totally protect against terrorist attack. What is critical to success in the war against terrorism is the capacity to minimise the strategic impact of any terrorist operation that might inevitably be successfully completed.[34]

Dividing the Islamic Moderates and Extremists

The futility of trying to fight terrorism at the tactical and operational levels leads to the search for a solution at the strategic or political level. This is in fact implied by the effects-based concept itself. Furthermore, the necessity to target the collective minds of a broad society rather than just a limited network of minds or the single mind of a particular leader demands a wide-scale, long-term EBS campaign.[35] More so than in any other form of engagement with an adversary, the truism that prevails is that one must truly know himself and his adversary.[36] Unfortunately, much of what is said and written by leaders and commentators in the West seems to suggest that the motivations of al-Qaeda specifically and the root causes of radical Islamic terrorism in general are not properly understood at all. Simple explanations such as "they are evil" or "they hate us" indicate that the West does not understand its enemy.[37]

The war against terrorism is in fact very much a battle against a specific breed of radical Islamic militancy that has adopted a grand strategy of seeking to spark a so-called clash of civilisations between the Islamic and non-Islamic worlds.[38] The desire for this civilisational clash seems to stem from the nexus between the fundamentalist beliefs of Wahhabi Islam and the religious Muslim ideology of Salafism, whose followers yearn for a return to the early medieval times during which Islam experienced its golden age.[39] Furthermore, and setting aside any tendency toward political correctness and religious sensitivity, the fact is that there is, to a degree, real identification by a majority of the Muslim world, including moderates, with the motivations and religious ideology of al-Qaeda.[40] In fact, it is this identification that is the true source of strength and support for al-Qaeda and its associated terrorist networks. Therefore, this is perhaps the strategic centre of gravity of the current phenomenon of international terrorism, and it is here that any EBS campaign must focus.

This understanding lies at the heart of the references made by many to the need for a counterterrorism strategy that aims to "drain the swamp" of the Islamic world or to "win [the] hearts and minds" of secular and moderate Muslims.[41] Any EBS campaign aiming to win Islamic hearts and minds would be profoundly complex and cannot possibly be suggested here in any great detail, though it might be helpful to broadly identify a possible target set.[42]

The Islamic madrassa, or religious school, in which young Muslims are indoctrinated with fundamentalist and anti-Western beliefs and values, could be countered with alternative education aid programs. The Arab media, particularly the al-Jazeera television network,

might be utilised as a communication medium with the Arab streets, in an attempt to balance or even counter the use of this platform by al-Qaeda itself.[43] An ongoing and widespread public relations campaign could be attempted to discredit terrorist actions and present counterterrorism actions in the most favourable context possible.

The power of images such as that of the toppling of Saddam Hussein's statue in Iraq, which received insignificant coverage in the Arab world, might be leveraged.[44] Effective advertising campaigns might be devised and employed in an attempt to shape popular Islamic opinion. The Arab diaspora could be engaged within Western nations to form a cultural bridge between the West and the Islamic world. Overall though, what will be vital for success is for all these operations to be designed, launched, and managed as part of an overarching, coherent, and coordinated EBS campaign.

Conclusion

The EBS required to combat international terrorism would echo the nature of the Cold War and the US strategy of containment against the Soviet Union, since the current war against terror can be won only by recognising that it is an ideological and geopolitical struggle.[45] This struggle must be fought with ideas and undertaken not just by the political leadership and the military but also by all levels of government, including diplomatic, informational, economic, social, and cultural means.[46] However, while the United States is perhaps the only nation with the capacity to assume a leadership role in this geopolitical battle against the radical Islamists, it cannot lead the ideological battle because it currently lacks legitimacy in the Muslim world. This is especially so because of US handling of the Palestinian issue and the close relationship between the United States and Israel. It is also true for other Western nations in general. Widespread Muslim distrust of America and the West will likely be a severely limiting factor of any EBS.

Another challenge to overcome in the employment of EBS is the political and administrative cycle of the leadership of Western and democratic nations. The relatively short time frames of these cycles may undermine the ability to properly plan and implement any EBS that will inherently need to be bipartisan and long-term in nature. A useful tool might be a national department or centre that can oversee the coordination of the multidisciplinary and cross-departmental efforts necessary at all levels of the state.

Exceptionally strong leadership and psychological resilience throughout society will certainly be required so that when inevitable terror attacks do occur, focus is maintained on long-term strategic goals rather than on any short-term reaction. The first response to any terrorist attack must be to ask what the intent of the attack is and what reaction the terrorist is trying to provoke. Any response that follows must then be undertaken as part of an effects-based campaign whose goal it should be not just to win the war against terror, but also to ultimately win the peace. ❑

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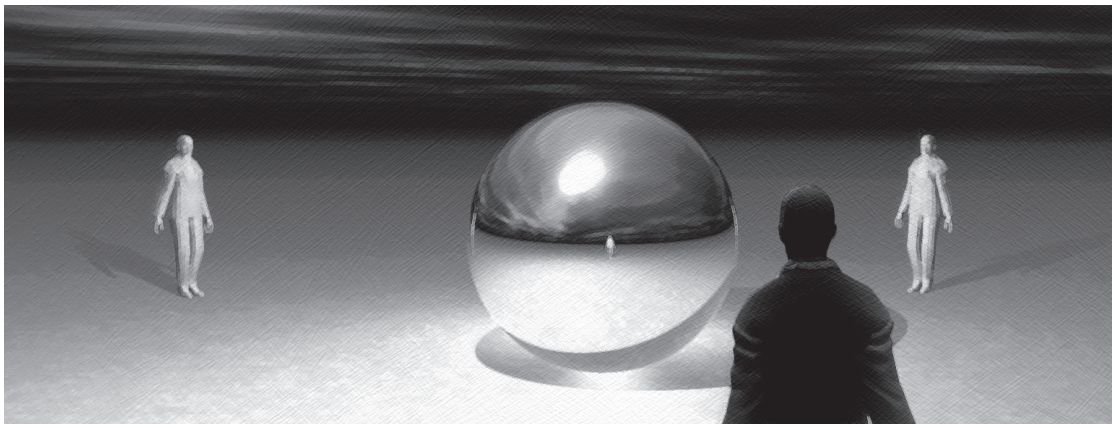
Editorial Abstract: Dr. da Rocha presents a Brazilian perspective of the relationship between pragmatical analysis and effects-based operations (EBO), showing how the former encompasses the latter's typical features and provides insights into some aspects of EBO. He notes that any set of connected purposive actions is a collective work and must be considered from multiple standpoints. A successful planner must be aware of these different frameworks and their interrelationships.

Effects-Based Operations

A Military Application of Pragmatical Analysis

Dr. Alexandre Sergio da Rocha



THE CONCEPT OF effects-based operations (EBO) is key for the US military. Arguably, one can trace its roots back to World War II, perhaps even earlier.[1] In a sense, this should not surprise us because planned actions, in war and elsewhere, are supposed to be rational and purposive—and every rational, purposive action purports a foreseeable effect.[2] This comment, however, is not trivial. Even though purposive action is connected to its effects, many questions arise regarding an action's true effect and awareness of undesirable side effects that could accompany the desired effect. Perhaps the key issue lies in determining an action's true effect because—as Lt Col Antulio J. Echevarria II points out—actions always have "first- and second-order effects."[3] The very important issue of determining the truly desired effect—critical to military planning—differs from determining an action's true effect. However, because the desired effect depends on how the repercussions of first- and second-order effects change the environment—political, economic, military, and sociocultural—both issues are intertwined.

The relevance of "effects" for military purposes, both regarding their connection with the actions that are supposed to generate them and considering their contribution toward a final goal, prompted Col Edward Mann, Lt Col Gary Endersby, and Mr. Tom Searle to call for "a fully developed theory grounded in effects-based thinking."[4] One could expect

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the conception of such a theory to follow two different trends. The first and more obvious one would involve creation of a comprehensive military theory of planning and warfare grounded in and permeated by effects-based thinking. Military thinking is already developing such a program, mainly in the United States. A second view would draw from research on the theoretical foundations of effects-based thinking. Even though this type of theoretical approach might seem less practical, it could prove useful when one applies its principles and findings to military issues.

This article takes the second approach, suggesting that effects-based thinking can apply to any planning of social actions, including military actions; it is embedded in a broader theory whose philosophical roots owe much to the tradition of American philosophical thought. This approach is not a mere academic exercise. By displaying the typical pattern of rational-purposeful acting, it can help distinguish between military and nonmilitary entities in an effects-based view of war.

During my tenure at the Brazilian National War College from 1986 through 1992, I developed a theory called pragmatical analysis. Even though it never became part of the methodology used at the college, one can apply it to governmental development policies to understand why many such policies that should have succeeded did not. The theory's usefulness became apparent when I presented a paper on Brazilian education, specifically using pragmatical analysis as a tool, at the VI National Forum held in São Paulo, Brazil, in 1993.[5] This article discusses the relationship between pragmatical analysis and EBO, showing how the former encompasses the latter's typical features and suggesting that it could possibly shed light on some aspects of EBO studies.

Effects-Based Operations: Concept and Essential Features

Maj Gen David A. Deptula describes EBO as a "campaign-planning philosophy [through which] the military planner uses superior knowledge to avoid attrition encounters, applying force at the right place and time *to achieve specific operational and strategic effects*" (emphasis added).[6] Colonel Mann, Colonel Endersby, and Mr. Searle point out the main advantage of EBO: "Focusing on the conditions desired—the effects—*to achieve assigned objectives enables one to avoid focusing on pseudo-objectives*, such as destruction" (emphasis added).[7] Colonel Echevarria adds that "US Joint Forces Command . . . defines EBO as 'a process for obtaining a desired strategic outcome or "effect" on the enemy, through the application of the full range of military and non-military capabilities at the tactical, operational, and strategic levels.' "[8] A complementary definition of *effect* describes it as the "physical, functional, or psychological outcome, event, or consequence that results from a specific action or actions"—a good, broad definition that we can use for the purposes of this article.[9] Colonel Echevarria goes on to say that "the Air Force currently has a vision of EBO that differs from that of the J9."[10] The US Air Force Doctrine Center, located at Maxwell AFB, Alabama, currently uses the following definition for EBO: "Operations that are planned, executed, assessed, and adapted *to influence or change systems or capabilities in order to achieve desired outcomes*" (emphasis added).[11] Even though these views differ in certain details, arguably the current usage of EBO by the US Air Force covers the concept's essential meaning, which involves the following:

- influence or change
- desired outcomes
- achievement

Influence or change results from applying power. However, if one plans the application of power, there ought to be some knowledge about *how things happen* in the world. Since such knowledge is theoretical in nature, one must validate it by real experience. Good, well-established theories allow us to calculate the effects of some actions in a notional universe that disregards all influences not considered by the theory. In the physical sciences, this approach often proves successful. However, the

probability of success decreases when one considers human action that affects people.

In economics, for instance, theoreticians and analysts like to secure their calculations against criticism by using the Latin term *ceteris paribus* ("if everything else remains unchanged") as a disclaimer—that is, by disregarding all phenomena not included in the theoretical calculations. However, any human action has a communicative content; it reveals some intention from the agent. When interested people discover such intention (whether rightly or wrongly), they change their minds and intended course of action to anticipate changes in the environment in order to make it the most favorable for their interests. Thus, ceteris paribus occurs only very rarely in real life. On the other hand, one must distinguish between *immediate effects* (first-order effects; henceforth referred to as the action's *products*) and *mediate effects* (second-order effects; henceforth referred to as the action's *outcomes*). Sometimes a desired product can serve as the means to a most undesirable outcome. Furthermore, a desired outcome can result from an uncomfortable product.

Looking at the US Air Force's EBO concept, one can perceive an emphasis on outcomes. Indeed, one finds products easier to foresee than outcomes. For instance, since every bombing produces destruction, one easily foresees destruction during the planning of a bombing mission, and it seems natural to assess bombings by measuring the destruction they have produced. However, even before EBO became prominent in military thought, military planners knew that destruction was only a means to obtain more complex results—denial, interdiction, paralysis, awe, and so forth. Thus, one must consider the multibranched path that leads from a product to multiple outcomes.

In fact, a military product may generate a cascade—and it often does—of political, economical, and sociocultural outcomes (and military ones as well). In such a case, it could well happen that a desired political outcome has to live with an undesired sociocultural outcome. The recent military victory of the US-led coalition in Iraq offers examples of such situations. So the question lies in determining what *desired outcome* means or in isolating this outcome by blocking the undesired ones that come from the same product.

The third key feature of EBO—achievement—differs from producing if we accept the meanings suggested above for both words. To achieve is to attain a previously established goal. It is comparatively easy to anticipate the achievement of first-order effects or products. However, it is much more difficult to foresee outcomes because they are diverse in nature and extended in time. The more extended in time the outcomes, the more influenced by future events they will be, and one cannot foresee most of these events without a deep scrutiny of circumstances, which necessitates multifarious, specialized examinations.

Thus, understanding the meaning of achieving a desired outcome depends on

- defining the desired outcome,
- assessing the probability of attaining the desired outcome because of circumstances resulting from a given product,
- assessing the probability of whether or not factors beyond one's control will disturb attainment of the desired outcome,
- assessing the convenience of all the compounds of outcomes that one could derive from a given product,
- verifying the possibility of isolating the desired outcome from other equally probable, undesirable ones, and
- getting the product from which the desired outcome would derive as a result of a planned development of circumstances.

So EBO essentially depends on (1) distinguishing between products and outcomes, (2) knowing most precisely the relationship between products and outcomes so as to assess the probability of a desired outcome, and (3) getting the product that originates the cascade of events leading to the desired outcome. However, none of those conditions mentioned above is typically military. They become a military issue when actions under scrutiny are military actions, when the actors are military,

and when the desired outcomes represent the accomplishment of military goals or serve as intermediate steps to attain victory in war.

Some questions arise about the meaning of "military actions" and "military actors." The standard usage of language distinguishes between typical military actions and other actions related to achieving military goals; it also distinguishes between military actors and civilian actors performing actions that are part and parcel of military operations. So the usage originates a discussion about the status of *other actions related to achieving military goals* and *civilian actors performing actions that are part and parcel of military operations*. Should we include them among military actions and military actors? These questions will become clear later in the article. For the moment, one must recognize that EBO has some features dependent on their military purpose but certainly has some other features—which one could call *structural features*—typical of any set of rational-purposive coordinated actions. Let us see how pragmatical analysis can enlighten our discussion.

Pragmatical Analysis: Basic Tenets

Pragmatical analysis is based on tenets that derive from pragmatism—the philosophical doctrine founded by American philosopher Charles Sanders Peirce, whose views favor actions' outcomes as the source of meaning to actions and establish intersubjective communication as a choice means for controlling the objectivity of any perception.[12] On the other hand, pragmatical analysis also derives from the ideas of American sociologist Erving Goffman, who states in his book *Frame Analysis* that "any event can be described in terms of a focus. . . . Different interests will . . . generate different motivational relevancies. . . . My aim is to try to isolate some of the basic frameworks of understanding available in our society for making sense out of events and to analyze the special vulnerabilities to which these frames of reference are subjected."[13]

In Goffman's view, reality is a complex construction that can be analyzed differently from diverse perspectives, each one illuminated by a focus determined by the interests that generate its motivational relevance. The same fact could appear differently—for instance—to a military analyst, to a political analyst identified with the interests of the political group in power, and to a political analyst identified with the interests of the political opposition. According to Goffman, in order to understand the perceived reality, one has to decompose it into superimposed frames, each one illuminated by a different interest, whose superimposition creates a pattern viewed as reality—complex, somewhat blurred, and many times contradictory. To understand what is going on here, we must separate these frameworks to restore each one's intrinsic logic (which could be contradicted by some other's own logic). However, one must be aware that none of these frameworks alone represents reality, so we cannot get rid of "uncomfortable" frameworks. Planners in any kind of activity should know all of them so as to avoid unexpected inconveniences. One also must be aware that even within a particular framework, there is no guarantee that reality could display such comfortable features as linearity and noncontradiction.

One can establish the basic tenets of pragmatical analysis by combining Peirce's and Goffman's views. The following concepts occur throughout this article: *Actions* are processes that bring about changes in the world; intervening is a promotive element identified as the will of an actor. An *actor* is the entity, physical or notional, whose intervention is necessary (and usually sufficient) to perform an action.[14] We must distinguish between an actor, which can be a notional entity consisting of people, and an *agent*, the person who is actually an action's efficient cause.[15] Agents can be actors or elements working for an actor. Actors can be collective, complex entities like the government, the Air Force, or the nation as a whole. However, one must bear in mind that any collective actor can perform actions only through agents; collective actors cannot perform actions without the mediation of their agents—that is, people.

Individual purposive actions are connected to a person's will. Individuals can display their

will in two ways: (1) agents can openly declare their intentions, or (2) one can find out their intentions by discovering some consistency in their courses of action, which appear as coordinated actions aiming at a goal. We will call the first way of establishing intentions *rhetorical*, the latter *pragmatical*. Because our language reflects views about the world that are consolidated in social conventions and transmitted through the education process, as a rule we classify as rhetorical the verbal discourse about what is going on, as well as all the implied justifications for actions, which we could present if necessary. Indeed, all of them—language and social practices that underpin everyday experience and social order—are subjected to the constraints of conventions, rules, agreements, and expectations that undergird a social order. For instance, if we do not officially recognize a country as our foe, we should not be rhetorically hostile toward it, even when we deem such a country a threat and prepare actions to curb its power. Thus, rhetorical definitions and pragmatical definitions often do not coincide.

As a rule, pragmatical definitions depend on the action's outcomes. So an action's outcome gives the action pragmatical meaning; an actor's actions (including the action's outcomes) determine his or her pragmatic identity; and the actor's interaction with other actors determines his or her social meaning. Thus, pragmatical definitions will depend strongly on frameworks because the same action can have different outcomes in different frameworks. Indeed, actions bring about a cascade of results that develop in a multibranched path, supposing that we distinguish each path according to specific interests. For instance, when the Syrian government announces the withdrawal of its troops from Lebanon, the event generates two different progressive happenings in the framework of a pro-Syrian analysis and in the framework of an anti-Syrian analysis. Because pro-Syrian and anti-Syrian political forces actually exist in Lebanon, we must expect that both analyses will correspond to real-world developments, even though they can be contradictory and conflictive.

However, if an international treaty or United Nations Security Council resolution imposes such a withdrawal as a legal requirement for acknowledging Lebanese de facto autonomy, the anti-Syrian framework would "win." That is, the juridical framework—the framework illuminated by the interest in keeping a formal legal order—would replicate its main features. For rhetorical purposes, the juridical framework must be the only framework recognized, even though the pro-Syrian segment of the population remains active and able to produce outcomes. In fact, no pragmatically relevant framework is extinguished only by solemn promises. Thus, any planner has to pay attention to two orders of reality. In the actual reality, many frameworks exist and have to be considered. But any action to be performed should comply with a juridical reality, which means commitment to the ideal of an agreed legal order to be preserved. The juridical framework constrains the rhetorical description of how things are going on.[16]

Because the pragmatic meaning of an action depends on the framework and because an actor is pragmatically identified by his or her actions, actors appear differently in different frameworks. However, the actors have only one juridical identity. So the planner has to consider that actor, which is the same for juridical purposes, differently because he or she is not pragmatically the same in different frameworks. On the other hand, if actors are pragmatically different in different frameworks (and they are because their actions' meanings are diverse in different frameworks), their relationship will also depend upon the framework considered. Consequently, the actor's social meaning may change when frameworks change.

Features and Dimensions of Purposive Actions

Purposive action is key to pragmatical analysis because all pragmatical definitions are related to actions' outcomes. Thus, one needs to further examine some of purposive action's features. Every such action has two dimensions: concrete and symbolic. The action's concrete dimension refers to its effects in the physical realm—its ability to change the physical world.

The action's symbolic dimension refers to how one can perceive its meaning.

Again, we must distinguish between the action's conventional meaning—ascribed to the action according to some established social rules—and its pragmatical meaning, which depends on its expected outcomes and the analyst's judgment about these outcomes according to different frameworks. The action can differ, according to the framework, both in the concrete and symbolic dimensions; however, the latter usually presents a greater spectrum of variation. In fact, the action's symbolic dimension depends on interpretation, which is illuminated by different interests. It is not uncommon for interpretations to diverge considerably when made by the performer, the person or group most directly affected by the action, and by third parties.

The Success of Purposive Actions

The success of a purposive action is a pragmatical issue. For example, in a third world agrarian country, first-grade students used to attend classes three hours a day. During the remaining time, they would help their parents with the work on the farm. A secretary of education—with a PhD in education from a first world university—knew that increasing their daily time in school would improve the students' scholarly skills. As a result, he decided to require children to stay in school for six hours a day. The secretary's good intentions triggered massive dropouts, with a consequent increase in illiteracy because the parents who tolerated letting their children stay away for three hours a day decided that staying six hours was way too long. This example shows the blatant difference between the theoretical product of a decision and its pragmatical outcome. Ideally (ceteris paribus)—if the economic environment could dispense with the children's work, or if the parents were aware of the advantages provided by education, or if the law could compel children to stay in school—the technical decision of increasing the students' daily time in school would have been a success. In real life, however, the outcome—what actually happened—was a failure.

So when it comes to the success of a purposive action, we must look at the outcomes. On the other hand, products, which one can theoretically link to actions that originate them, are easier to predict. The link between products and outcomes is a causal path: products of an action are themselves causes of effects, which are causes of other effects, and such causal chains bring about outcomes, which are eventual results from the first product.

However, one must be aware that the first product is not the only cause of the final outcome; many intervening events that can occur later can have a determinant influence on the final result. Moreover, the causal chain's evolving path is multibranched—that is, many parallel causal chains evolve from the same product. Further, the process is a composite of many actions whose concrete and symbolic dimensions one must assess in several frameworks. A successful purposive action must (1) bring about a desired outcome and (2) do so without originating undesired consequences. Such a result must hold true in all relevant frameworks.

For clarity's sake, one can depict the connection between an action and its effects—which means, in this case, products *and* outcomes—as follows:

1. The intended, expected effects are brought about by the action purposively performed to produce such effects, without undesired consequences. We call such an action *successful purposive action.*

2. The intended, expected effects are brought about by the action purposively performed to produce such effects, but undesirable effects (usually unexpected) also result from the action. We call such an action a *successful purposive action with negative side effects.*

3. The intended, expected effects are brought about by the action purposively performed to produce such effects, and unexpected, desirable effects also result from the action. We call such an action a *serendipitous action*, which is a successful

action with unexpected, positive side effects.

4. The action performed fails to produce the intended, expected effects, with or without undesired consequences. We call such an action an *unsuccessful purposive action*.

The following are several kinds of unsuccessful purposive actions:

1. *Partly unsuccessful actions*, which do not completely achieve the desired effects, even though no unexpected effects occur.
2. *Partly unsuccessful actions with positive side effects*, which do not completely achieve the desired effects, but do produce some unexpected, desirable effects.
3. *Partly unsuccessful actions with negative side effects*, which do not completely achieve the desired effects and bring about unexpected, undesirable effects.
4. *Frustrated actions*, which do not achieve the desired effects at all and do not bring about unexpected, undesired effects.
5. *Frustrated actions with negative side effects*, which do not achieve the desired effects at all and bring about unexpected, undesirable effects.
6. *Frustrated actions with positive side effects*, which do not achieve the desired effects at all and bring about unexpected, desirable effects.

Unsuccessful purposive actions can arise from three diverse circumstances, which can occur separately or jointly:

1. The action performed can bring about unexpected effects or fail to generate the desired effects because of a mistake in its performance. This is usually called human failure.
2. The action performed can bring about unexpected effects or fail to generate the desired effects because the ideas about how things happen in the world (generically referred to as explanatory theory) do not apply to the circumstances. This is usually described as a wrong application of a right explanatory theory.
3. The action performed can bring about unexpected effects or fail to generate the desired effects because unanticipated effects spring naturally from the performed action. In this case, one does not dispute the application of an explanatory theory, but the theory proves wrong.

Complexity of Purposive Actions

Regarding the importance of the effects intended for the desired end state, one could classify purposive actions as *determinant*, when they are directly connected to the achievement of the desired end, or *mediative*, when they constitute only an intermediate step to make possible other actions more directly connected to the achievement of the desired end state. Being determinant or mediative is not an action's property; it depends on the goal to be attained, the way chosen to attain such a goal (the word *purpose* will be used to combine the goal and way to reach the goal), and the explanatory theory used—that is, how the actors suppose that things happen in the world.

For instance, when the US government decided to treat Panama's Gen Manuel Noriega as a common drug trafficker, it tried to overthrow him by diplomatic and economic actions. Such actions would be mediative—to eventually bring him to an American court as a private person. The explanatory theory of international relations that inspired this approach would suppose that economic and diplomatic pressure would prove sufficient to expel General Noriega from power in Panama through a Panamanian insurgency. However, the chosen explanatory theory proved wrong—or inapplicable to the case—and Noriega resisted the pressures. Then, through Operation Just Cause, the United States intervened militarily in Panama in December 1989, arrested him, and brought him before an American court to have him convicted. Of course, there was some political and diplomatic onus on the United States as a consequence of its military action,

because instead of having Panama's political forces overthrow General Noriega—a determinant action that Panamanians would perform—the US military had to do it. Within the framework of sovereign states' international relations, the American pressure was a frustrated action with negative side effects. In the military framework, it was a partly successful action because even though the United States could not achieve its original purpose—overthrowing a foreign ruler without direct military intervention—and a second purpose had to replace the first one, it attained the goal even if by different means.

Both determinant and mediative actions are complex. Complexity means that even if it is true that logic and dynamic connections between an action and its effects are clearly understandable only within each framework, the developments of outcomes in all frameworks are interdependent. Therefore the logic and dynamics that apply in one given framework are disturbed (i.e., affected and even modified) by the logic and dynamics that apply to all other frameworks in which the same original action generates outcomes. In the example above, the logic and dynamics that presided over the international environment in 1989 interfered with the US foreign policy to exclude military action from the list of preferred solutions. That may not have been the case decades before and might not be the case today.

Complexity is also linked to the issue of determining the action's extension. In fact, depending on the scope of the analysis, one can consider the same array of events an action or a chain of connected actions. Even a very simple action like drinking a glass of water is a composite of actions—picking up the glass, picking up the bottle, pouring water into the glass, bringing the glass to the mouth, pouring the water into the mouth, and swallowing the water. One can further analyze these simple actions. To pick up something or to swallow it involves a great deal of muscular effort, which means the working of several muscles, and is extended in time. So one must decide where to draw the line.

Usually one defines actions at the rhetorical level because they are described by natural language. However, pragmatical analysis implies that the action's extension can reach its relevant outcomes. This approach is particularly important when we know that in some cases, an action triggers a process whose outcomes become unavoidable. In fact, sometimes after triggering an action, one can still perform other actions that entail the interruption of the process that would bring about the envisaged outcome. But in many cases this is impossible. After one triggers the action, the outcome becomes unavoidable. Due to space limitations, this important issue will receive no further elaboration even though it can blur the distinction between mediative and determinant actions.

Pragmatical Analysis and Effects-Based Operations

An action's outcomes as a source of meaning lie at the core of both pragmatical analysis and EBO. In fact, all the key ideas contained in the EBO concept—influence or change, desired outcomes, and achievement—relate to outcomes. But they relate also to the ideas of intention or purpose, which makes EBO a special case of acting in sets of connected, purposive actions. Thus, a general theory of purposive acting does apply to EBO.

Perhaps it is useful to EBO studies to emphasize pragmatical analysis in intersubjective communication as a choice means for controlling objectivity. The key role of intersubjectivity in the purposive-acting processes makes clear that EBO—as any set of connected purposive actions—is a collective work that one must consider from multiple standpoints. Such a requirement results not only from the human plurality of views but also from reality's being a complex construction. For that reason, we need to distinguish between rhetorical definitions and pragmatical definitions, which seldom coincide.

For instance, regarding EBO we must distinguish between the (pragmatical) meaning of a sortie for the squadron commander and for the joint force air component commander. For the former, it is a mission in itself. Mission

accomplishment means success. For the latter, the sortie is but part of a bigger puzzle, and its meaning depends on how it fits in a set of orchestrated air operations. If we go on to include the president and secretary of defense, the meaning of that particular sortie is connected not only to its outcomes related to military goals—particularly if it is a determinant action—but also to political developments that could arise from these outcomes. In the case of defective planning or execution, a frustrated sortie within the squadron commander's framework could become a serendipitous action within the political framework. Let's remember that the success of a purposive action is a pragmatical issue and that pragmatical definitions depend strongly on frameworks.

In the case of EBO, the explanatory theory that guides power application involves military doctrine in a profound way. Thus, pragmatical analysis can prove useful for calling attention to the difference among human failure, wrong application of a right explanatory theory (or wrong application of sound doctrine), and the case in which theory proves wrong (when evolutions in the environment or technology supersede doctrine). Pragmatical analysis also would call attention to EBO's complexity in the sense that military actions are extended in time, and their outcomes in all different frameworks are interdependent. This is not a novelty but the very reason why EBO is so critical in warfare. The understanding that military actions bring about political, economic, and sociocultural outcomes (not to mention the military ones) is the true basis for the call for "a fully developed theory grounded in effects-based thinking." Our hope, however, is that awareness of the different frameworks and their interrelationships can help make ideas clearer when one plans, executes, assesses, and adapts military operations.

Conclusion

EBO and pragmatical analysis share many common features because both refer to sets of connected purposive actions. Even though EBO has a specific military meaning, the greater scope of pragmatical analysis encompasses EBO's main features. So it is important to consider that pragmatical analysis can show that many EBO features are not a consequence of military aims but are typical of all sets of connected purposive actions. Hopefully, looking at problems from a more general standpoint can prove helpful in shedding light on the diverse aspects of EBO, mainly those not typically military. ❑

Notes

1. "A review of a number of cases going back as far as World War II indicates that the US military has struggled to apply effects-based principles for over 50 years." Col Edward Mann, Lt Col Gary Endersby, and Tom Searle, "Dominant Effects: Effects-Based Joint Operations," *Aerospace Power Journal* 15, no. 3 (Fall 2001): 93. However, they go on to say that "the military has never really institutionalized the thought processes necessary to ensure consistent adherence to EBO principles. Only now is EBO being tentatively and unevenly incorporated into service and joint doctrine." Ibid.

2. Jürgen Habermas says that "the model of purposive-rational action takes as its point of departure the view that the actor is primarily oriented to attaining an end (which has been rendered sufficiently precise in terms of purposes), that he selects means that seem to him appropriate in the given situation, and that he calculates other foreseeable consequences of action as secondary conditions of success." *The Theory of Communicative Action*, vol. 1 (Boston: Beacon Press, 1984), 285.

3. Lt Col Antulio J. Echevarria II, " 'Reining in' the Center of Gravity Concept," *Air and Space Power Journal* 17, no. 2 (Summer 2003): 91.

4. Mann, Endersby, and Searle, "Dominant Effects," 95.

5. The national forums are annual seminars aimed at offering inputs to a Brazilian national-development project. They gather select people from the academic, political, and social sectors in Brazilian society under the direction of Dr. João Paulo dos Reis Velloso and Dr. Roberto Cavalcanti de Albuquerque. Dr. Velloso was formerly secretary of planning for the Brazilian federal government, and Dr. Albuquerque was his undersecretary at that time. The paper referred to in the text was published as the first chapter in the book *Educação e Modernidade* (*Education and Modernity*) (São Paulo, Brazil: Nobel, 1993), edited by Velloso and Albuquerque. The paper's submission followed a special invitation from Dr. Velloso and Dr. Albuquerque, who asked the author to specifically apply pragmatical analysis to the 1992 forum's key issue.

6. Maj Gen David A. Deptula, "Air Force Transformation: Past, Present, and Future," *Aerospace Power Journal* 15, no. 3 (Fall 2001): 90.

7. Mann, Endersby, and Searle, "Dominant Effects," 93.

8. Echevarria, " 'Reining,' " 96n24.

9. Ibid.

10. Ibid.

11. I am indebted to Mr. Al Lopes, editor of the *ASPJ em Português*, for kindly verifying the currency of the information.

12. Charles Sanders Peirce, who was born in 1839 and died in 1914, is considered the most original thinker and greatest logician of his time. People usually take for granted their perception's objectivity, unconcerned about the possibility of distortions or other sources of error in perception. Pragmaticists refuse any dogmatic foundation of objectivity. Rather, they emphasize the practical means of making sure that one's perception is objective—the agreement of other people who share the same perceptual experience. So the communication among people—intersubjective communication—is the pragmatical basis of any claim of perception's objectivity. In other words, the pragmatical criterion of objectivity is an intersubjective agreement that recognizes a claim of objectivity as indisputable.

13. Erving Goffman was born on 11 June 1922 in Canada and died on 19 November 1982 in Philadelphia, PA, while president of the American Sociological Association. He is well known for his contributions to studies in face-to-face interaction and identity building. Erving Goffman, *Frame Analysis: An Essay on Organization of Experience* (Boston: Northeastern University Press, 1974), 8, 10.

14. These definitions deserve the criticism of logical circularity. However, they reflect the fact that the compound actor-action is a unit, which appears as different analytical elements only in the rhetorical realm. The actor-action unit is an essential concept in pragmatical analysis, but space restrictions do not allow for a full discussion of this issue here.

15. Aristotle stated that any changes in objects are determined by four *aitia* or causes:

> Different accounts of a cause correspond to different answers to why-questions about (for example) a statue. (1) "It is made of bronze" states the material cause. (2) "It is a statue representing Pericles" states the formal cause, by stating the definition that says what the thing is. (3) "A sculptor made it" states the "source of change," by mentioning the source of the process that brought the statue into being; later writers call this the "moving cause" or "*efficient cause*." (4) "It is made to represent Pericles" states "that for the sake of which," since it mentions the goal or end for the sake of which the statue was made; this is often called the "final" (Latin finis; "end") cause. (emphasis added)

Routledge Encyclopedia of Philosophy, CD-ROM, version 1.0 (London: Routledge, 1998). Modern science dropped out all Aristotelic *aitia* but the efficient cause, which is called simply "cause." However, when the study comes to phenomena involving human will and conciousness, some finalistic explanation—the explanation in terms of final cause—is needed. All theory of purposive action is grounded on final causes. So it seems convenient here to stress the agent as an action's efficient cause, distinct from the final cause, which defines the action's purpose and triggers the agent's motivation.

16. Because the social order is guaranteed by its juridical structure, any actor's admissible rhetoric must comply with what is going on within the juridical framework. In some cases, an intention to produce calculated diplomatic effects might lead to the breaking of this rule. When that is not the case, breaking this rule can be a disastrous diplomatic and/or political mistake.

Being prepared to deliver precise effects anywhere at anytime as part of a joint and/or coalition force is a top priority.

—Gen T. Michael Moseley, USAF

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Tomorrow's Air Warfare

A German Perspective on the Way Ahead

Lt Col Frank M. Graefe, German Air Force

Editorial Abstract: Operation Iraqi Freedom's application of joint operations, networkcentric warfare, and improved sensors and weapons will influence future NATO equipment and force-structure decisions. The author states that nations who do not adjust to these developments will not meet the standards required of future coalition partners. NATO's implementation of a Response Force and other initiatives indicates that it understands this message and is strengthening transatlantic links.

IN YEARS TO come, operational scenarios will increasingly require multinational cooperation.[1] This notion applies not only to defense alliances with structures already established in peacetime—such as NATO or the European Union of the future—but also, and more particularly, to so-called coalitions of the willing, tailored to the specific requirements of a given mission. Some time ago, for example, the essential program for achieving this interoperability included NATO's Defense Capability Initiative. Meanwhile, the NATO Response Force, expected to reach its full operational capability in 2006, has become the driving force of transformation and the benchmark of its success. Plans call for equipping the European contingents of the NATO Response Force in a way that ensures they can fully cooperate with US forces across the entire range of operations. Due to

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the United States' military-pioneering role and technological superiority, that country will predominantly determine the developments in warfare over the next several decades. Therefore, one would do well to take a closer look at the US policy documents and strategy papers that will govern such developments and to draw lessons from the US conduct of operations during Operation Iraqi Freedom. Doing so will help identify the changes that coalition partners of the United States have to follow in order to ensure compatibility in terms of the conduct of operations.

Lessons learned from Iraqi Freedom make it possible to derive conclusions about air warfare in future conflicts. However, any evaluation of the results from that operation must consider the war's initial situation:

- Sorties flown in the northern and southern no-fly zones neutralized a major share of the enemy air defense systems before the beginning of hostilities. Furthermore, the Iraqi air force did not fly a single sortie. Thus, the coalition enjoyed air superiority over most of the country from the very beginning, obviating the need for an extended air campaign as a prerequisite for the ground offensive.
- Analysis of the initial deployment must not ignore the fact that since Operation Desert Storm in 1991, coalition forces—some of them with heavy equipment—had remained in the Gulf region, able to prepare for a major force deployment.
- Ultimately, one must consider the differing capabilities of the adversaries involved in the conflict in terms of technology and training. From the very beginning, the Iraqi armed forces, elements of which were more suitable for preventing domestic riots than for conducting warfare, proved incapable of acting jointly. Thus, what took place on the Iraqi side during the operation amounted to a very static land war.

Due to these circumstances, then, one cannot readily apply lessons from the Iraq war to future conflicts. Nevertheless, one can derive some principles from the US transformation concept and the practical course of the war. The central element of the transformation process entails an evolution towards forces that lend themselves to more efficient employment. Future wars will be waged by rapidly deployable, smaller, more mobile, and lighter forces, capable of immediately engaging in combat operations in the theater of operations. In this context, mere force ratio will become less important. Indeed, future operations will exhibit jointness, further development of networkcentric warfare (NCW), intensive employment of special operations forces (SOF), and an increase in information operations. Thus, a faster pace, improved accuracy and flexibility in the conduct of operations, accurate but massive air strikes, and effects-based operations will determine operational planning.[2] Other determining factors will include the extended use of outer space; utilization of high technology, smart bombs, and unmanned aerial vehicles (UAV), which deliver near-real-time reconnaissance results for a networked battlefield; and rapid movement of mobile ground forces.

These trends, occasionally summarized in the media under the term *Rumsfeld Doctrine*, are reflected in concepts and strategy papers developed to a major extent by military thinkers before Donald Rumsfeld's second tenure as US secretary of defense. One finds these thoughts particularly well expressed in the military strategic-policy document known as *Joint Vision 2020*.[3] This article considers the new level of jointness, the capability to conduct NCW, the significance of new sensors and weapons, and the importance of mobility and support.

Jointness

The war in Iraq marked the fading of air forces' predominant role and the increasing one played by land forces. In the Gulf War of 1991, the war in Kosovo, and Operation Enduring Freedom, the focus shifted to the capabilities of airpower, with armies relegated to the background. Today, high-tech war waged from the air provides an essential contribu-

tion to the reconnaissance and engagement of the enemy's political and military command and communication structure. Surgical operations conducted over great distances and with substantial precision (which spares the civilian population and minimizes the loss of friendly forces) demonstrate the vital and crucial impact of airpower. Even today, however, airpower alone cannot decisively achieve the operational objective. Accordingly, the ground war during Iraqi Freedom showed that heavy armored units with considerable firepower still constitute a necessary element of combined-arms combat.

In general, although future wars will still require ground forces, airpower and air superiority will continue to have decisive importance for operational success—despite all asymmetric forms of war. For instance, given the endurance and precision of their modern assets, air forces can relieve land forces by preventing the concentration or forming up of the enemy's army. Moreover, air forces together with naval forces contribute to operational success by deploying personnel and providing logistic support.

The Iraq war clearly showed that success requires each service's simultaneous, optimized employment of a whole range of diverse, quickly employable weapon systems based on impressive information superiority and information density on the entire battlefield; SOF employment; and information operations. In particular the interaction among SOF personnel; intelligence, surveillance, and reconnaissance (ISR) assets; and air forces, as well as the employment of 802 US Navy Tomahawk land-attack missiles demonstrated an essential aspect of joint warfare. The war also illustrated the advantage and effectiveness of joint operations, which had developed from mere cooperation in terms of deconfliction in 1991 to an exemplary integration. In the future, boundaries between the individual types of air-warfare operations will become blurred or even disappear completely since we can employ weapon platforms more flexibly. Moreover, the increased flow of information will make a clear differentiation between various categories of air operations obsolete with respect to the planning and deconfliction process. The effectiveness of joint warfare also implicitly concludes that smaller but better-trained force components are sufficient for the successful conduct of operations. For instance, ground forces employed in Iraqi Freedom comprised only three US divisions and one British division.

However, this extent of jointness works only if the individual services are closely networked. The Iraq war and other conflicts of the recent past did not include a coherent battlefield with an uninterrupted front line, and one cannot assume such a configuration for future wars. Without networking, armed forces fail to operate efficiently in such an environment. Thus, we can conclude that NCW is an absolute prerequisite for jointness.

Networkcentric Warfare

Characteristics of NCW include speed, information superiority, and flexible decision superiority—the basis for execution superiority. Information superiority depends upon a multitude of different space- and air-based sensors. In this context, future development will include minimizing compatibility problems among different sensors used by the individual services and organizations to gather reconnaissance data. The ultimate objective involves producing a uniform, accessible situation picture in which information from the various domains flows together. The US Air Force has designed its ISR manager, currently under development, to present data provided by Airborne Warning and Control System (AWACS), Joint Surveillance Target Attack Radar System (JSTARS), U-2, Rivet Joint, and UAV aircraft, as well as the US Navy's EP-3 electronic-reconnaissance aircraft, simultaneously in one situation picture. One finds a similar approach in the concept of the MC2A-X multisensor experimental aircraft, designed to integrate on one platform the abilities of AWACS to control air warfare, of JSTARS to monitor land warfare, and of Rivet Joint aircraft to collect signals intelligence. Furthermore, one should consider adding tanker functions to this aircraft's repertoire.

In order to ensure decision superiority, procedures have been developed and organizations established so that representatives of the reconnaissance, intelligence-service, and military-leadership communities can make coordinated, quick decisions. One finds a negative example—delayed decision making—in the time-consuming targeting process that occurred in the Kosovo war. But the time-sensitive-targeting cell established in the combined air operations center (CAOC) in Riyadh, Saudi Arabia, during the Iraq war enabled forces in the theater of operations to react immediately, thanks to the capability of making rapid decisions.

Only the networking of modern sensors—which can perform battlefield reconnaissance and surveillance in near real time—with weapons provides the basis for information and decision superiority. Such networking directly affects the pace of operations. For instance, it reduced the time required from target acquisition to the release of weapons (i.e., the sensor-to-shooter gap) from days or hours in the Gulf War of 1991 to hours or minutes in Iraqi Freedom. Future technical developments, such as the aforementioned MC2A-X and the ISR manager, as well as new procedures will further reduce this gap. In Afghanistan, for instance, a Predator UAV communicated reconnaissance data directly to an AC-130 for the first time. This not only obviated the need for time-consuming data transfer as well as analysis and evaluation in a CAOC, but also allowed the AC-130 to use its weapons directly during first overflight without conducting a preliminary reconnaissance flyby. Additionally, this procedure displayed another essential element of NCW. Specifically, forwarding information to lower levels of command results in more autonomous and decentralized warfare, giving units at those levels more responsibility. This kind of warfare—in which the commander gives lower-level units more freedom and responsibility to fulfill their mission as long as they act in accordance with overall tactics—has been part of German warfare doctrine since the mid-nineteenth century; it is known as *Auftragstaktik*. That is why we think German forces are well prepared to employ NCW in this regard.

In order to avoid losing contact with the digitized network system of NCW, one must establish the following prerequisites: interoperability, modern means of identification, the ensuring of swift decision making, improvement of joint planning, and further technological development of sensors and weapons. In the future, NCW will link reconnaissance results from outer space and the air with intelligence, the command and communication level, and the battlefield. It does not replace direct combat, however. The information edge and distribution of information to appropriate levels can minimize but not eliminate the Clausewitzian "fog of war."

Sensors

The fact that 10 types of UAVs equipped with different sensors saw action in the Iraq war illustrates their increased significance in various operations. Their importance will continue to grow in view of the replaceability and manifold employment options of unmanned systems. The endurance of UAVs allows them to loiter over or pursue a target until a weapon system arrives to engage it (see the above-mentioned example of the Predator and the AC-130). Alternatively, plans call for equipping UAVs themselves with weapons—witness the arming of the Predator with Hellfire missiles, which has set a trend in this regard. UAVs are also performing ISR. In the Iraq war, almost no manned tactical aircraft conducted penetrating air-reconnaissance missions. Apart from satellite reconnaissance, UAVs such as the Predator or Global Hawk performed standoff, high-altitude, or penetrating reconnaissance.

Due to the UAV's all-weather and night-fighting capability, weather conditions and darkness-related restrictions will become less significant factors in warfare. These unmanned systems make it possible to fight accurately at night, without either restrictions or detection by the enemy. They can also employ weapons accurately in fog, clouds, smoke, or haze. Thus, the battlefield of the future will no longer offer the enemy any sanctuaries since UAVs can monitor and engage forces around-the-clock.

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An all-weather, night-fighting capability will become an indispensable prerequisite for any participation in air operations.

Domination of outer space will become a greater factor in air superiority. Although space-based military and civilian systems deliver communication, reconnaissance, and weather data, only satellites permit the employment of new weapons controlled by the global positioning system (GPS), such as the Joint Direct Attack Munition. With their synchronized time base, satellites play an essential role in NCW. During Iraqi Freedom, a total of 27 satellites determined the position of friendly and foreign forces and identified target coordinates.

The Iraqis' attempt to jam the GPS marked the beginning of "navigation warfare," in which asymmetrical countermeasures will seek to deny access to state-of-the-art navigation means. After the Iraq war, Secretary Rumsfeld announced accelerated implementation of "navigation warfare doctrine," designed to deny the enemy the utilization of the GPS while ensuring its military usage by friendly forces. This would involve local jamming of the civilian GPS signal or using new technologies.

Weapons

Operations showed that preplanned actions in the classical modes are becoming less significant due to short-notice changes to the mission and the allocation of targets to aircraft during a sortie. These procedures require flexibility in terms of command, control, employment, and armament. Modern platforms develop into multirole aircraft designed for several modes of employment and capable of carrying as many types of munitions as possible.

The choice of munition changes the appearance of air warfare. Developments in arms technology lead to improvement in precision capability and the utilization of several different control systems in a weapon (e.g., laser-guided, satellite-controlled, and inertially guided systems). As a result, operations become more cost-effective, optimization of weapons employment to the target improves, and the risk of collateral damage declines. For instance, the relatively low number of civilian casualties in the Iraq war and images showing the largely intact cityscape of Baghdad reflect the success of efforts to spare civilian targets, as does preservation of the civilian infrastructure and economic basis in order to establish a postwar order.

To some extent, coalition aircraft used inert bombs during the war to emphasize the effect of bombing rather than the effect of weapons. However, despite the high technology, dumb bombs represented 30 percent of all munitions dropped because of their usefulness against certain targets—for example, the engagement of mechanized units. All in all, one observes a trend away from preplanned to dynamic targeting and from classical attrition bombing to effects-based bombing.

The employment of strategic bombers in cooperation with SOF personnel suggests that their endurance and load capacity will make them significant weapon systems for the future, whenever we establish air superiority as a prerequisite for their employment. Thanks to their range, obtaining basing permissions for them is not necessary. In the future, only a command, control, communications, computers, intelligence, surveillance, and reconnaissance platform that is secure, fast, effective in near real time, and redundant will assure the establishment of air superiority. The integration of other armed forces in technological and procedural terms will become more difficult because of the accelerated development of US airpower.

Mobility and Support

In this context, one must take into consideration the factors of combat service support. Logistics must be able to stay abreast of this quick-paced conduct of operations. For instance, during Iraqi Freedom, the capacity of the logistics system determined the pace of the land forces. Turkey's refusal to let US forces operate from its territory underscores our dependence on basing rights, an issue that will become particularly significant in the future.

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We must also have the ability to deploy forces quickly and over great distances. One option entails acting early and deploying forces to smaller, temporary locations in or near potential crisis areas, as occurred in the Iraq war. Another option involves strategically relocating forces, as the United States did when it moved the 173rd Airborne Brigade from Italy to the theater of operations in northern Iraq and airlifted the 26th Marine Expeditionary Unit directly from the Mediterranean Sea into the combat area.

Since we can transport only a small percentage of personnel and materiel by air, we must begin to concentrate on permanently relocating weapon systems to sea-based contingents all over the world. During the aforementioned air-land operation in northern Iraq, a C-17 transport aircraft relocated an M-1 Abrams tank for the first time, but relocating a single tank with a C-17 requires too much effort. From the sea, however, one can project military power worldwide, collect enemy information at an early stage, and become less dependent upon support bases and foreign-sovereignty issues. Using large, fast transport platforms (e.g., airlifters) to conduct strategic sealift and airlift will determine the course of future warfare.

Conclusion

The insights gained from Iraqi Freedom will have a lasting influence on the doctrine of future (air) wars. Jointness, networkcentric warfare, and, in particular, improvements in sensors and weapons characterize this new form of war, which will change the "classical picture" of armed forces and have implications for the structure and equipment of the armed services. But the asymmetry typical of this war does not permit a generally valid conclusion. Regardless, we have crossed the threshold of a new form of warfare. A nation that does not follow this development will find itself unable to meet the standards required of a coalition partner in future wars.

By implementing the NATO Response Force, the alliance has demonstrated its understanding of this message. NATO seriously approaches transformation by reorganizing alliance structures, armed forces, and capabilities. Doing so will serve to gradually close the often quoted transatlantic gap in the fields of technology and the conduct of operations, thus strengthening NATO as the key transatlantic link. ❑

Notes

1. During the course of Operation Iraqi Freedom, all 29 students of the 47th German Air Force Command and Staff College course at the Führungsakademie in Hamburg (the German Armed Forces Command and Staff College) evaluated the lessons learned from the air war over Iraq. They produced a 200-page study published in Germany and disseminated throughout the German Air Force. This article derives from that study's last chapter, written by the author.

2. One glossary defines effects-based operations (EBO) as "a process for obtaining a desired strategic outcome or 'effect' on the enemy, through the synergistic, multiplicative, and cumulative application of the full range of military and nonmilitary capabilities at the tactical, operational, and strategic levels." *Joint Forces Command Glossary*, http://www.jfcom.mil/about/glossary.htm#E. Decisive action takes place directly against an enemy's critical vulnerabilities and centers of gravity in order to achieve effects formerly attainable only after long periods of tactical and operational attrition. For instance, during Iraqi Freedom, coalition forces took pains to spare the energy-supply system, transportation infrastructure, and media institutions so as to enhance the postwar order. EBO offers an opportunity to reduce costs and avoid collateral damage. Doing so helps justify war in the public eye—a requirement that will become even more significant in the future.

3. *Joint Vision 2020* (Washington, DC: Joint Chiefs of Staff, 2000).

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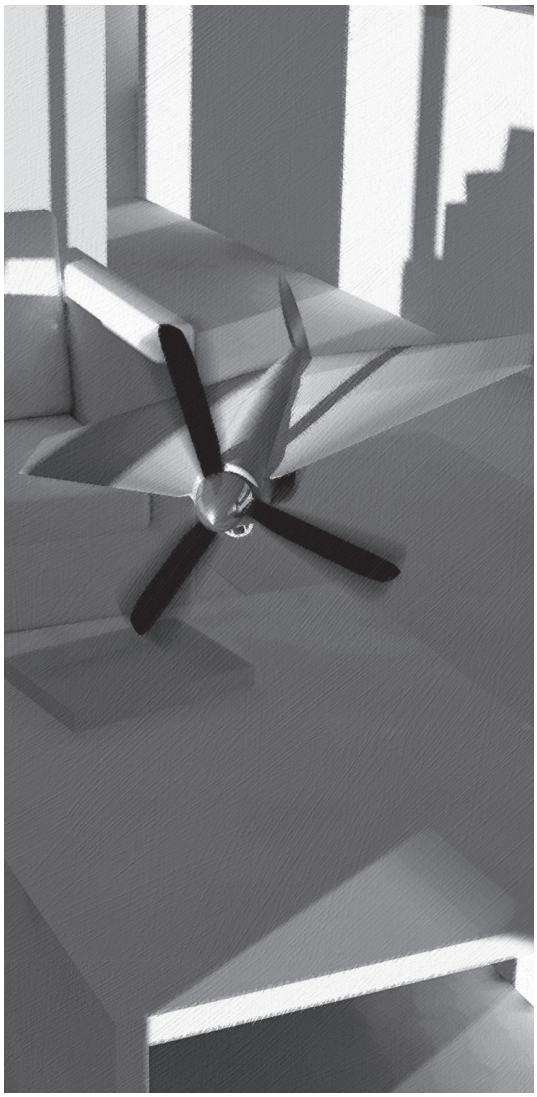

Unmanned Aerial Vehicles/ Unmanned Combat Aerial Vehicles

Likely Missions and Challenges for the Policy-Relevant Future

MANJEET SINGH PARDESI

Editorial Abstract: Mr. Pardesi analyzes the strategic implications of unmanned aerial vehicles (UAV) from a Singaporean point of view and concludes that UAVs' lack of situational awareness and need for ever-larger amounts of communication bandwidth are major drawbacks that can be partially compensated for by various means. However, the author concludes that UAVs will complement, but not replace, manned aircraft.

Victory smiles upon those who anticipate the changes in the character of war, not upon those who wait to adapt themselves after the changes occur.

—Giulio Douhet

THE ABSORPTION OF modern information and communications technologies (ICT) has transformed the US military. Unmanned aerial vehicles (UAV) and unmanned combat aerial vehicles (UCAV) are playing a crucial role in this transformation, as they provide the military with a new platform that exploits the advances in ICTs. At the same time, they are integral to the concept of networkcentric warfare. Although interest in UAVs is as old as the history of manned aviation, UAVs started making news due to their military effectiveness in recent conflicts such as Afghanistan (2001) and Iraq

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(2003). The Afghanistan campaign highlighted the growing role of UAVs because it was in Afghanistan that the UAVs actually started attacking targets in addition to performing their primary mission of intelligence gathering and guiding weapons to their target.[1]

This article seeks to answer whether UAVs represent a truly disruptive technology. What will be the impact of UAVs on manned aircraft, and how does the increased use of unmanned platforms alter the strategic landscape? To this end, this article will examine various air operations—intelligence, surveillance, and reconnaissance (ISR); suppression of enemy air defenses (SEAD); and counterair—to establish the disruptive impact of UAVs, if any. This research will also briefly discuss how miniature/micro aerial vehicles (MAV), which are a subset of UAVs, are likely to be deployed on the battlefield.

UAVs, UCAVs, and MAVs

The US Department of Defense (DOD) defines a *UAV* as "a powered, aerial vehicle that does not carry a human operator, uses aerodynamic forces to provide vehicle lift, can fly autonomously or be piloted remotely, can be expendable or recoverable, and can carry a lethal or nonlethal payload. Ballistic or semiballistic vehicles, cruise missiles, and artillery projectiles are not considered unmanned aerial vehicles."[2] While the idea of removing the pilot from the cockpit may be conceptually simple, the UAV presents an operational challenge, as it is a system designed to fly in a hostile environment. Conventional wisdom states that removing the pilot from the aircraft would mean that the extensive and expensive life-support equipment is not needed, thereby making the UAV more cost-effective.

Even though the UAV concept seems somewhat revolutionary in nature, it is not new. The first heavier-than-air, sustained, powered flight was achieved by a pilotless aircraft when Dr. Samuel Pierpoint Langley launched his steam-powered aircraft over the Potomac River on 6 May 1896, for a flight lasting over one minute.[3] After the Wright brothers' first piloted, powered flight on 17 December 1903, unmanned aviation took a backseat to manned aviation. While continuously maintaining a general interest in unmanned technologies, the United States devoted most of its time and resources to developing manned aircraft in the twentieth century. This was primarily a result of the fact that unmanned platforms represented an immature and relatively expensive technology.

Although the United States used UAVs for operational reconnaissance missions in Vietnam, it was Israel's successful use of UAVs during operations in Lebanon in 1982 that ignited American interest in this system.[4] The US Navy acquired the Pioneer UAV from Israel and used it to provide tactical-level intelligence during Operation Desert Storm in 1991.[5] During Operation Enduring Freedom in Afghanistan, the Predator UAV started performing "armed reconnaissance" missions as mentioned earlier, and the Global Hawk UAV made its debut in the skies over Afghanistan in 2001 even though it was an experimental system then.[6] The Predators continued their combat role by attacking high-value targets in Iraq in 2003. Surveillance UAVs also helped US special forces in preventing Iraqis from launching any hidden Scud missiles.[7]

The United States is also heavily investing in a new class of unmanned platforms—MAVs. They are roughly two orders of magnitude smaller than manned systems (some as small as six inches). These compact, lightweight air vehicles carrying miniature sensors are playing a key role in the war against terrorism.[8] While MAVs are more vulnerable to attack and loss due to their low altitude, this is offset by the fact that they are extremely stealthy and very cheap. Their compact size and low weight will allow them to be carried by individual soldiers. The US Air Force is deploying MAVs for force protection in the shape of Lockheed Martin's SentryEye.[9]

Roles and Missions

While there is a good deal of confidence in the underpinning technology of unmanned

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platforms, there is a great deal less certainty surrounding their roles and missions. UAVs/UCAVs are likely to play a key role in mission areas commonly categorized as "the dull, the dirty, and the dangerous."[10] This section discusses some of the more important air missions (ISR, strike/SEAD, and counterair) to determine if UAVs/UCAVs can replace manned platforms in some or all of these roles. This will also include a short analysis of the role of MAVs on the battlefield. It must be pointed out that the move towards unmanned platforms is not necessarily due to the inadequacy of manned aircraft. Rapid technological advancement over the past decade has led to a "technological push" in this direction. Moreover, since the end of the Cold War, the United States has been attempting to replace manpower with technology, mostly because it retains strategic interests in every corner of the globe but is increasingly hesitant to commit its military personnel for many of these missions. The move towards the unmanned platform is a result of all these developments.

Intelligence, Surveillance, and Reconnaissance

UAVs have been traditionally used as ISR assets, and their ability to do so is being boosted by advances in sensors and modern ICTs. For the United States, ISR collection is a critical factor in achieving the *Joint Vision 2020* operational concept of "precision engagement."[11]

During the Vietnam War, the photos provided by the Ryan 147 Lightning Bug—a reconnaissance UAV—revealed precise locations of surface-to-air missile (SAM) sites, enemy airfields, ship activity in Haiphong Harbor, and battle damage assessment (BDA), intelligence that otherwise would have been obtained only if manned aircraft were sent in harm's way.[12] In Desert Storm, the Pioneer UAV contributed to the tactical successes of the US Navy and Army by playing an important role in target designation, damage assessment, and reconnaissance.[13]

In Afghanistan, Global Hawk was used for reconnaissance prior to strikes and for post-strike BDA.[14] The Predator was used in Afghanistan to feed imagery to AC-130 special operations gunships and special operations teams on the ground.[15] Global Hawk accounted for only 5 percent of intelligence sorties during Operation Iraqi Freedom but produced 50 percent of the information on time-sensitive targets.[16] UAVs retreated to their traditional role of reconnaissance in Iraq in spite of some successes in combat roles in Afghanistan. A dozen UAVs launched 115 Hellfire missiles and laser-designated 525 targets in Afghanistan. In Iraq, where more than 56 larger UAVs and more than 60 smaller portable ones were used, UAVs launched only 62 Hellfires and laser-designated only 146 targets. The main reasons for this disparity were Iraqi winds and sandstorms—these aircraft are much lighter than their manned counterparts—and the increased need for intelligence in the Iraqi campaign.[17]

UAVs face two competing systems for performing ISR missions: manned platforms and satellites. While providing a significant improvement in information-collection capability over these systems, UAVs also pose some serious limitations.

Large and manned aircraft, capable of carrying Airborne Warning and Control Systems (AWACS) and Joint Surveillance Target Attack Radar Systems (JSTARS), have limited maneuverability and self-defense. Unlike the loss of UAVs, loss of these expensive manned systems is likely to cause severe domestic political repercussions for the United States. However, given the current state of technology, UAVs cannot completely replace AWACS and JSTARS manned aircraft in ISR missions. The military is seeking sensors with high-definition television standards, foliage-penetration radar with hyperspectral imagery, synthetic-aperture radar, and moving-target indication mode to track targets in all types of terrain throughout the spectrum of military operations.[18] Advanced sensor technology is still under development, and it is not sufficiently developed to perform the complex battle management and command and control functions handled by AWACS and JSTARS personnel. Due to their inability to absorb data and reason (at least for the foreseeable future), UAVs cannot process and relay the same amount of data as a pilot in the cockpit (who can do so by learning, expe-

riencing, and intuition) and cannot maintain a 360-degree situational awareness (SA).

Manned missions provide high-resolution data and are extremely flexible at adapting to multiple-mission scenarios; however, their main limitation is their loiter time. UAVs, on the other hand, are capable of long loiter times; are smaller and hence stealthier than manned platforms; are much less costly to procure, operate, and support; and avoid putting pilots at risk. However, fast jet-based tactical reconnaissance remains a much sought after, but scarce, capability for UAVs.[19] The use of Global Hawk, Predator, and JSTARS systems (i.e., both manned and unmanned platforms) was the key factor behind the shattering of the Republican Guard and the success of the Scud-suppression campaign in western Iraq during Iraqi Freedom.[20] It is possible that in the future, UAVs will be faster and more maneuverable; however, there are trade-offs as higher speed creates penalties for loiter time, one of the biggest assets of unmanned platforms.

Desert Storm highlighted the pivotal role that satellites will have in future conflicts. However, UAVs have a major advantage over satellites in addition to being cheaper, as it is easier to alter their flight paths and coverage. Moreover, they provide a comparatively cost-effective method of collecting ISR. UAVs have an additional advantage of being able to fly closer to the target.[21] However, the major drawback with UAVs, as mentioned previously, is their lack of SA. This weakness can be overcome by integrating UAVs with reconnaissance satellites, but this creates an additional problem. High data rates (bandwidths) are essential for real-time interactive command and control systems like flight controls, video reception, and transmissions. UAVs are major consumers of bandwidth.[22] Since 11 September 2001, the US bandwidth requirement has increased eightfold due to the war in Afghanistan and the pursuit of terrorists in the region.[23] Stationing the mission control on a standoff aircraft (within line of sight) would decrease the dependency on satellites generated by stationing the mission control on the ground thousands of miles away. Autonomous UAVs will also require less bandwidth as more data will be processed on board.[24] Moreover, since UAVs fly in close proximity to the target, they would need to have a high signal-to-noise ratio (especially if they are flying far from their control station), thus increasing their possibility of detection.

MAVs have tremendous potential for ISR operations. In the battlefield, they are likely to be operated by individual soldiers for local reconnaissance. MAVs integrated with a high-flying UAV will circumvent the need to develop foliage-penetration sensors. They will also play an important role in urban operations, which may require stealthy airborne assets closer to the ground. At sea, MAVs can also be deployed from ships to gather intelligence to prevent acts of maritime terrorism. They may also be fielded in a hostile environment to detect people equipped with shoulder-fired missiles to attack aircraft. MAVs shall play an important role in real-time detection and analysis of a biological or a chemical agent in an infected environment. They are also likely to play an important role in humanitarian missions (e.g., searching for survivors amidst rubble from earthquakes).

The way forward is to integrate manned, unmanned, and satellite-based sensors to create a common operational picture of the battlefield. Development of ICTs and software algorithms to integrate the data provided by the three platforms will be crucial to ISR operations in the future. The information-collection system of the future is likely to be based on space assets providing wide-area surveillance at a low level of resolution, but looking for cues that require detailed monitoring. Manned and unmanned vehicles will perform this detailed monitoring.

Armed Reconnaissance and Suppression of Enemy Air Defenses

US military strategy following the embassy bombings in Africa focused on targeting Osama bin Laden and his training camps with Tomahawk land attack missiles (TLAM). This strategy did keep US troops out of harm, but it suffered from many operational limitations. The most important of these was the long delay between

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acquiring reliable intelligence on the precise location of time-sensitive targets (from the skies over Afghanistan) and the execution of an actual cruise missile attack (from ships in the Arabian Sea). The United States was looking for an "armed reconnaissance" platform to strike time-sensitive targets. Technological momentum led the US Air Force to fit two 45-kilogram (kg), laser-guided Hellfire-C missiles to a Predator UAV.[25] On 15 November 2001, two Hellfire missiles launched from a Predator, killing Muhammad Atef, al-Qaeda's chief of military operations.[26] This was the first use of the Predator as a weapons platform. On 3 November 2002, almost a year later, a CIA-operated armed Predator flying over Yemen, with Yemen's approval, killed a top al-Qaeda operative, Ali Qaed Sinan al-Harthi, and his five companions traveling in the same car.[27] By performing successful "strike" missions, these incidents demonstrated the usefulness of armed UAVs in the global war against terrorism. These strike missions opened up a debate on a possible new role for the armed UAVs—SEAD.

The US DOD defines the term *SEAD* as an "activity which neutralizes, destroys, or temporarily degrades surface-based enemy air defenses by destructive and/or disruptive means."[28] The Predator UAV was credited with two strikes in Iraqi Freedom in March 2003—one strike was against an antiaircraft vehicle while the other was against a television satellite dish in Baghdad.[29] The United States is currently developing a new version of the armed Predator UAV, called Predator B, which will have the capability to carry eight Hellfire missiles instead of two.[30] The United States is also developing newer platforms—UCAVs—with a primary offensive mission of strike and SEAD. To determine the efficacy of the unmanned platform in a SEAD role, the United States will need to consider two rival challenges: the adoption of new countertactics by its opponents and the development of new antiair systems.

Today, the United States relies exclusively on the F-16 and the Navy's EA-6B for defense-suppression missions. The loss of a modern, expensive platform like the F-16 (and its pilot) will be a major political embarrassment for the United States, in addition to being an economic loss. SEAD is an important mission as it helps in attaining "air superiority." The air forces can attack the heart of the enemy (i.e., perform the "interdiction" mission) only after gaining command of the air. However, during Desert Storm, the superstealthy F-117 allowed the United States to hit the enemy's key nodes within the opening minutes of the conflict.[31] In order to avoid a similar fate during the air war over Serbia, the Serbs chose not to deploy a determined air defense system. This enabled them to launch 700 missiles in the course of the 78-day conflict and cause enormous frustration to US Airmen.[32] It was recently reported that the United States was using its drones to scan Iran for nuclear weapons. It is likely that the Iranian authorities did not activate their air defense systems out of the fear of revealing their positions.[33]

In addition to such tactics, the United States is also likely to face "antiaccess-threat systems" like cruise missiles, theater ballistic missiles, and advanced air defense systems. The range of modern SAMs (estimated to be between 50 and 250 miles) is forcing the United States to develop strategies and systems to reduce the risk to its Airmen.[34] Missiles launched from a distance from mobile SAM sites are difficult to detect, and the high speed of newer missiles makes them more maneuverable. This means that the friendly aircraft/UAVs will have a very narrow "escape zone" to avoid the SAMs. Unmanned jet engine *g-forces* (*g*) limitations (±12 *g*) do not significantly exceed those of the human pilot (between –3 *g* and +9 *g*) and hence do not substantially increase defensive capability against missiles.[35] The cost arithmetic further complicates the analysis and is not useful in determining the efficacy of UCAVs over current standoff systems like cruise missiles. Joint Direct Attack Munitions employed by UCAVs may be cheap compared to the Tomahawk, but the UCAV, which is an expensive recoverable platform, is likely to suffer considerable attrition due to its proximity to the target.[36] Unmanned systems are "attritionable" but not expendable (i.e., it is fine to lose them only when the alternative to their loss is manned aircraft). Moreover, on an average,

unmanned platforms are lost at a much higher rate than manned aircraft.[37]

It makes sense to use low-cost UAVs and/or decoys to locate the positions of enemy SAM sites, which may then be attacked as a part of a "reactive" SEAD strategy.[38] This, together with UCAVs equipped with passive sensors (an extremely stealthy platform), represents an effective counter to mobile defenses. There are, however, several constraints here that must be kept in mind: (1) the primitive nature of current target-recognition programs means that a human operator must be kept in the loop to authorize the "kill," thereby increasing the bandwidth requirements, and (2) integration with other ISR platforms is necessary to locate time-sensitive targets.[39] These constraints put serious limitations on the use of unmanned combat platforms in reactive SEAD missions.

UCAVs are more likely to play an important role in "preemptive" SEAD missions (where the exact locations of enemy SAM sites are known) as opposed to reactive SEAD missions. UCAVs, integrated with manned and unmanned assets like AWACS aircraft, F-16s, F-117s, Global Hawks, and communications satellites, will play a role in future SEAD missions (reducing some risk to manned assets in this high-threat environment); however, they will be only one of many platforms used for this mission. UAVs/UCAVs are nevertheless very suitable for strike missions, especially against a very heavily defended target due to their high level of stealth.

UAVs/UCAVs will also play an important role in electronic-attack missions. However, they will play only a limited role at best, as the future use of electromagnetic-pulse weapons and directed-energy weapons will increase the risk of self-jamming for the unmanned platform itself.

Swarms of MAVs equipped with sensors and miniaturized warheads are theoretically capable of attacking high-value targets such as radars and launchers of SAM sites; that is, they are likely to play an important role in SEAD missions in the future.[40] The global positioning system allows precise autonomous navigation and position reporting for MAVs, which are critical to the military application of these technologies. Some of the limitations of this technology are its short-range and high-damage potential (especially due to the prevailing weather). Microelectromechanical systems, micromanufacturing, and nanotechnology could provide an exponential leap in micro-miniaturization for weapons, sensors and platforms.[41] However, for operational success, MAVs would have to be integrated with other UAVs or manned aircraft to address the complete operational scenario.

Counterair

In March 2003, a Predator launched a Stinger air-to-air missile at an Iraqi MiG before the Iraqi aircraft shot it down.[42] This has led to the speculation that armed UAVs/UCAVs will play a role in counterair operations (and by extension as air superiority fighters in the future). The US DOD defines the term *counterair* as "a mission that integrates offensive and defensive operations to attain and maintain a desired degree of air superiority. Counterair missions are designed to destroy or negate enemy aircraft and missiles, both before and after launch."[43]

The USAF F-15C, USN F-14A/D, and USN and USMC F/A-18 aircraft were the platforms instrumental in the command of the skies over Iraq during Desert Storm.[44] The same air assets were available during Operation Allied Force for the function of counterair. Lockheed Martin's F-22 Raptor is likely to play the key role in America's air superiority efforts in the years ahead.[45] Stealth, maneuverability, and cost are the most important design prerequisites for air superiority fighters of the future.[46] Whether or not a UCAV will replace the F-22 fighter (a manned platform) is a crucial question as American air superiority in a future conflict depends on the answer to this question. This is also a timely question since the decisions taken today will guide the research, development, production, and training of the new system (manned or unmanned replacement of the F-22 fighter) over the next two decades. Aerial combat is the most challenging mission for manned aircraft to perform, and it is believed that missiles do not always kill the adversary (especially one equipped with significant counterair assets and

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capabilities like the MiG-29 Fulcrum and the Su-27 Flanker)[47], so close engagements are necessary. Combat survivability remains the most significant limitation to UAV employment.[48] As previously mentioned, limitations imposed by line-of-sight data-transfer requirements will enhance the role of satellite communications. However, the current American and allied satellite communications infrastructure is incapable of supporting any sizable number of UAVs or UCAVs. Global Hawk consumed five times the total bandwidth used by the entire US military in the Gulf.[49] Autonomous systems will reduce bandwidth requirements. However, it is unlikely that the UCAV will replace the manned aircraft in all operations as some politically sensitive targets will still need a human operator to make the "kill decision." Moreover, systems based on artificial intelligence are unlikely to replace the human completely, even though significant developments are likely to occur over the next two decades.

Stealth requirements dictate that the UCAV weapons be small and precise. The weaponization of the unmanned platform for air superiority missions is not likely to happen over the next two decades.[50] In the near future, the UCAV is not likely to have its own air-to-air weapons; that is, no air-to-air weapons are being designed or produced at the moment with the UCAV as the launch platform. For the foreseeable future, the UCAV is going to carry air-to-air weapons like the Sidewinder missile and advanced medium-range air-to-air missile that already exist.[51] UAVs/UCAVs will be used predominantly to provide active sensors against highly lethal antiaircraft weapons in support of inhabited vehicles.[52] UCAVs are unlikely to replace the manned aircraft for air combat missions in the policy-relevant future. The future will see a mix of manned and unmanned platforms together with space weapons in counterair operations.

Conclusions

On the one hand, UAVs enhance the ability of the United States to intervene militarily anywhere in the world whenever its interests are threatened (whether through ISR missions or in a combat capacity through surgical strikes, preemptive SEAD missions, etc.) without putting its forces in harm's way. On the other hand, this possibility will drive certain nations to acquire armed UAVs and/or weapons of mass destruction to oppose a US-led intervention.[53] It must be emphasized that the greatest risk is posed by terrorists' use of armed UAVs. UAVs will also enable regional powers to bolster their power-projection capabilities. India has raised its profile in the Indian Ocean region by operationalizing its first full-fledged UAV base in Kochi where its Southern Naval Command is based.[54]

The UAV is an innovative weapon system that avoids placing a pilot in harm's way, but it is not a truly disruptive technology as there will always be missions that will require the manned aircraft. Likewise, the unmanned platform has less flexibility and greater vulnerability; moreover, it cannot analyze its environment. Furthermore, many advanced unmanned platforms are as expensive as manned aircraft, and their high cost makes them attritionable, not expendable. Their software complexity, automation, and communications architecture make them operationally unreliable for many missions. Thus far, communications technology has limited the effectiveness of the unmanned platform, especially its armed version.

UAVs also face considerable challenge from competing systems like satellites and TLAMs. Satellites not only provide better situational awareness, but also avoid international norms for violating national/sovereign airspace and are thus far invulnerable to shootdown. TLAMs have proven superior in weapon-delivery roles. However, many dull, dirty, and dangerous missions will see an increased role for the unmanned platform.

UAVs are going to perform the critical ISR mission in future military operations where they are likely to fly tactical missions together with their manned counterparts upon obtaining cues from satellites. MAVs with their potential to substantially transform urban operations and special operations missions will see their role enhanced in future conflicts. UCAVs

and armed UAVs shall also perform strike and preemptive SEAD missions in the future but are not likely to perform reactive SEAD missions due to the proliferation of sophisticated air defense systems worldwide. They are also likely to play an important, but limited, role in electronic-attack missions. The proliferation of sophisticated counterair assets makes UAVs unsuitable for counterair missions, and communications and automation technology limitations, together with political ones (the authorization to fire), reduce their usefulness for combat missions. It is unlikely that the unmanned platform will make significant inroads into the force-application role in the policy-relevant future.[55]

However, their potential for homeland security and commercial applications will give unmanned platforms prominence in the years ahead. The defense-industrial sector is likely to see an influx of new players from the commercial sector, as advances in unmanned technologies are likely to have important commercial applications. However, unmanned platforms can never replace the manned aircraft, as the unmanned platform is just a machine that takes cues from the environment and follows a predefined set of instructions to react (i.e., it cannot analyze its environment). Even artificial-intelligence systems can at best only improve existing technology; they can never supplant humans because of the uncertainties and rapid changes of war. ❑

Notes

1. Keith Somerville, *US Drone Takes Combat Role*, BBC News Online, 5 November 2002, http://news.bbc.co.uk/1/hi/world/2404425.stm.

2. Joint Publication (JP) 1-02, *DOD Dictionary of Military and Associated Terms*, 30 November 2004, http://www.dtic.mil/doctrine/jel/doddict/data/u/05601.html. Unless stated otherwise, this article uses the phrase "unmanned platform" to refer to UAVs and/or UCAVs.

3. Maj Thomas G. O'Reilly, "Uninhabited Air Vehicle: Critical Leverage System for our Nation's Defense in 2025" (master's thesis, Air Command and Staff College, Air University, Maxwell AFB, AL, 1999), 9–10.

4. Elizabeth Bone and Christopher Bolkcom, *Unmanned Aerial Vehicles: Background and Issues for Congress*, 25 April 2003, 2, www.fas.org/irp/crs/RL31872.pdf.

5. Ibid.

6. John McWethy, "Robo-Planes: Unmanned Aircraft Redefines How Military Wages War," http://abcnews.go.com/sections/wnt/dailynews/roboplane020501.html.

7. Andrew Krepinevich, *Operation Iraqi Freedom: A First Blush Assessment* (Washington, DC: Center for Strategic and Budgetary Assessments, 16 September 2003), http://www.csbaonline.org/4Publications/Archive/R.20030916.Operation_Iraqi_Fr/R.20030916.Operation_Iraqi_Fr.htm.

8. Michael A. Dornheim and Michael A. Taverna, "War on Terrorism Boosts Deployment of Mini-UAVs," *Aviation Week and Space Technology* 157, no. 2 (8 July 2002): 48; and Mark Hewish, "Small, but Well Equipped," *Jane's International Defense Review* 35 (October 2002): 53–62.

9. Hewish, "Small, but Well Equipped," 53–62.

10. Office of the Secretary of Defense, *Unmanned Aerial Vehicles Roadmap, 2002–2027*, December 2002, iv, http://www.acq.osd.mil/usd/uav_roadmap.pdf. Dull missions include missions requiring coverage time beyond the capability of manned sorties. Dirty missions include reconnoitering areas contaminated with radiological, chemical, or biological agents. Dangerous missions include high-risk missions like SEAD with less need for supporting aircraft.

11. Chairman of the Joint Chiefs of Staff, *Joint Vision 2020* (Washington, DC: Government Printing Office, June 2000), 12, http://www.dtic.mil/jointvision/jv2020.doc.

12. Lt Col Richard M. Clark, *Uninhabited Combat Aerial Vehicles: Airpower By the People, For the People, but Not With the People*, CADRE Paper no. 8, College of Aerospace Doctrine, Research and Education (Maxwell AFB, AL: 2000), 15–16.

13. Ibid., 34–35.

14. John Persinos, "Unmanned Aerial Vehicles: On the Rise," *Aviation Today*, 1 February 2002, http://www.aviationtoday.com/cgi/rw/show_mag.cgi?pub=rw&mon=0202&file=0202rorep.htm.

15. Bone and Bolkcom, *Unmanned Aerial Vehicles*, 14.

16. Thomas Donnelly and Michael Vickers, *Iraq: Lessons Learned*, American Enterprise Institute, 8 December 2003, http://www.aei.org/events/filter.,eventID.337/summary.asp.

17. Gail Kaufman, "UAVs Shifted Role in Iraq Operations—Shot Fewer Missiles Than in Afghanistan," *Defense News*, 8 December 2003, http://www.defensenews.com/sgmlparse2.php?F=archive2/20031208/atpc8593809.sgml.

18. Mark Hewish, "Unmanned, Unblinking, Undeterred," *Jane's International Defense Review* 35 (September 2002): 47–55.

19. A Predator is a slow platform that takes 30 minutes to travel 50 nautical miles.

20. Donnelly and Vickers, *Iraq: Lessons Learned*.

21. UAVs within 10 kilometers (km) of an object can resolve to 10 centimeters (cm), and those within one km to just one cm. See Michael O'Hanlon, *Technological Change and the Future of Warfare* (Washington, DC: Brookings Institution Press, 2000), 34.

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22. Currently satellites offer low data-transfer rates. For a brief technical description of bandwidth requirements, see Maj William K. Lewis, "UCAV—The Next Generation Air Superiority Fighter?" (master's thesis, School of Advanced Air Power Studies, Air University, Maxwell AFB, AL, 2002), 44–46.

23. Bone and Bolkcom, *Unmanned Aerial Vehicles*, 17–18.

24. Ibid. The Global Hawk is an autonomously, rather than a remotely, piloted vehicle. In spite of this, it still requires multiple-satellite and line-of-sight links for control, in-flight mission reroutings, and the relay-of-sensor data.

25. Dennis M. Gormley, "New Developments in Unmanned Air Vehicles and Land-Attack Cruise Missiles," in *SIPRI Yearbook 2003—Armaments, Disarmament and International Security* (Oxford: Oxford University Press, 2003), 416–17.

26. Ibid., 417.

27. Ibid.

28. JP 1-02, *DOD Dictionary*, http://www.dtic.mil/doctrine/jel/doddict/data/s/05165.html.

29. Bone and Bolkcom, *Unmanned Aerial Vehicles*, 14.

30. Ibid.

31. The F-117, which flew only 2 percent of the total attack sorties, struck nearly 40 percent of the strategic targets. See Thomas A. Keaney and Eliot A. Cohen, *Revolution in Warfare? Air Power in the Persian Gulf* (Annapolis: Naval Institute Press, 1995), 189–93.

32. See Gen John Jumper, "Global Strike Task Force: A Transforming Concept, Forged by Experience," *Aerospace Power Journal* 15, no. 1 (Spring 2001): 27.

33. Nazila Fathi, "Iran Says Pilotless US Planes Are Spying on Nuclear Sites," *New York Times*, 17 February 2005, A-16.

34. Countering "antiaccess" threats implies a capability to operate from well outside an enemy's defenses. See John A. Tirpak, "The Double Digit SAMs," *Air Force Magazine* 84, no. 6 (June 2001): http://www.afa.org/magazine/june2001/.

35. Airframes and mechanical components can be designed to operate out to the ±20 *g* envelope. See Lt David Bookstaber, USAF, "Unmanned Aerial Combat Vehicles—What Men Do in Aircraft and Why Machines Can Do It Better," *Air and Space Power Chronicles*, June 2000, www.airpower.maxwell.af.mil/airchronicles/cc/ucav.pdf. However, designing jet engines that could withstand ±20 *g* would require billions of dollars in development or would produce limited thrust-to-weight ratios (speed). Moreover, sensor-technology limitations are unlikely to allow the vehicle to maneuver in the proper direction at the proper time. See Thomas P. Ehrhard, "Unmanned Aerial Vehicles in the United States Armed Services: A Comparative Study of Weapon System Innovation" (PhD diss., Johns Hopkins University, 2000), 574.

36. Joint Direct Attack Munitions employed by UCAVs have a unit cost of $21,000 compared to $600,000 for a Tomahawk cruise missile. See Col Robert E. Chapman II, "Unmanned Combat Aerial Vehicles: Dawn of a New Age?" *Aerospace Power Journal* 16, no. 2 (Summer 2002): 60–73. However, UCAVs will need to fly closer to the target and are not inexpensive. The Joint Strike Fighter will have a flyaway cost of $35 million, and it is estimated that the Defense Advanced Research Projects Agency/Boeing X-45 UCAV will cost about $25 million. See Bill Sweetman, "UCAVs Grow Fat on Requirements," *Jane's International Defense Review* 36 (1 May 2003): 44–47.

37. The crash rate of a Predator is an order of magnitude higher than that of the F-16. Moreover, a large number of crashes are due to human-operator error. See Sweetman, *UCAVs Grow Fat on Requirements*, 44–47.

38. There are two categories of SEAD missions—reactive and preemptive. For a detailed analysis of the usefulness of UCAVs for SEAD missions, see Lt Col Robert E. Suminsby Jr., "Fear No Evil: Unmanned Combat Air Vehicles for Suppression of Enemy Air Defenses" (master's thesis, Air War College, Air University, Maxwell AFB, AL, 2000).

39. It is unlikely that political and military authorities would leave the "kill" decision to automated systems, for such a move would empower a machine to autonomously make the decision to kill a human. Moreover, there would be significant political backlash if autonomous machines hit innocent civilians by mistake, for example, during an operation in an urban area. The time for imagery transmission will depend on the bandwidth. Moreover, the time for human decision making is a major unknown. These delays can prove fatal under the high-threat SEAD environment. Also, the size of a deployed UCAV fleet is a major concern as it increases bandwidth requirements. Integration with satellites for data transmission will be essential for UCAV command and control.

40. Hewish, "Small, but Well Equipped," 53–62.

41. For the potential military applications of MAVs, see Timothy Coffey and John A. Montgomery, "The Emergence of Mini UAVs for Military Applications," *Defense Horizons*, December 2002.

42. David A. Fulgham, "Predator's Progress," *Aviation Week and Space Technology* 158, no. 9 (3 March 2003): 48. See also David A. Fulgham, "Stinger Eyed for UAV Role," *Aviation Week and Space Technology* 156, no. 9 (4 March 2002): 44.

43. JP 1-02, *DOD Dictionary*, http://www.dtic.mil/doctrine/jel/doddict/data/c/01329.html.

44. Thomas A. Keaney and Eliot A. Cohen, *Gulf War Air Power Survey Summary Report* (Washington, DC: Government Printing Office, 1993), 56.

45. See *F-22 Raptor*, http://www.fas.org/man/dod-101/sys/ac/f-22.htm.

46. Stealth enhances survivability before engagement, and maneuverability enhances survival while engaged.

47. The proliferation of advanced S-300 and S-400 integrated air defense systems is also a serious concern for Americans.

48. The low altitude of tactical UAVs makes them susceptible to small-arms fire. Strategic UAVs fly higher but at speeds observable by radar. Moreover, they may be within the range of modern SAMs. See Maj Ronald L. Banks, "The Integration of Unmanned Aerial Vehicles into the Function of Counterair" (master's thesis, Air Command and Staff College, Air University, Maxwell AFB, AL, 2000), 18.

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49. See Lt Col Kurt A. Klausner, "Command and Control of the Air and Space Forces Requires Significant Attention to Bandwidth," *Air and Space Power Journal* 16, no. 4 (Winter 2002).

50. Lewis, "UCAV—The Next Generation," 50.

51. Ibid., 52.

52. Manned platforms will mostly rely on passive sensors.

53. At least 40 countries have produced more than 600 different types of UAVs, many with ranges in excess of 300 km. See Gormley, "New Developments," 410.

54. Josy Joseph, *Navy to Use UAVs to Spy on Sea-Lanes*, 29 December 2003, http://www.rediff.com/news/2003/jan/31uav.htm.

55. However, advances in nanotechnology have the potential to boost the role of the unmanned platform (MAVs) in a combat mission.

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Air Superiority

A Sine Qua Non?

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Editorial Abstract: Colonel D'Odorico utilizes the perspective of smaller air forces to explore the importance of obtaining air superiority before executing other tasks, pointing out the fallacy of these forces adopting the doctrine of larger air forces without first thoroughly examining whether it will satisfy their own strategic needs. He argues that each country should adapt doctrine to its own circumstances, a procedure that would perhaps result in a more limited strategy that gains air superiority in certain areas at specific times.

I BEG CLEMENCY FROM those who may blame me for betraying one of the most revered airpower dogmas—the notion that one always needs to conduct a battle for air superiority—but the time has come to question whether some popular doctrinal concepts espoused by the world's major air forces truly apply to smaller air forces. Clinging to customary doctrinal practices based only on emphatic assertions that they are correct could be as imprudent as allowing ourselves to be seduced by a modernizing urge to change everything. Therefore I ask the reader to pause and think before deciding to make

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me pay dearly for defying the most respected principle of air war—at least until now.

To begin this discussion, we should ask ourselves if we must swear upon the basic-airpower-doctrine manual's assertion that regardless of circumstances in a given situation, a struggle for air superiority is mandatory before striking the enemy's centers of gravity. Most veteran pilots will not hesitate to stress what has served as a golden rule since the Allies experienced such painful losses when they flew massive bombing raids over Europe in World War II. That war seemed to demonstrate that air superiority was a prerequisite to attacking strategic targets. Additionally, experience since that war shows that ground forces lose their freedom of maneuver when opposing aviation can strike defensive positions, artillery, mechanized assets, and armor day or night, regardless of the weather.

Belief in the need to gain air superiority has been instilled in the world's air forces as a principle that they have to follow if they want to win a war. This doctrine quickly spread and gained respect all around the world. Curiously, despite the fact that the doctrine strongly affected long-standing tactical rules, few strategists felt compelled to conduct in-depth studies to determine whether it had universal validity. Instead, air strategists preferred to praise and provide a doctrinal framework for the experiences of veteran air forces.

If the world's big air forces approved that doctrine, how could members of smaller and less experienced ones question what their own leaders taught? The new gospel of aerial war ruled the air staffs and overruled anything that went against lessons learned the hard way. Skeptics found themselves doomed to professional ostracism, and no one dared challenge the axioms made holy by Hugh Trenchard, Giulio Douhet, Billy Mitchell, and Alexander de Seversky.

Winning Air Superiority

I share the belief that in order to gain freedom to maneuver in the air and on the land, we need to have (1) as a minimum, local air superiority, and (2) as a maximum, air supremacy over the whole theater of operations. But this agreement does not lead me to give up the title of this article. To gain adequate freedom of action in the air, we may or may not need to commit significant military resources. Time and local circumstances will determine the real degree of that commitment. Essentially, the main concern is not how to eliminate the opposing air threat but to discern whether we need to launch a distinct air superiority campaign to eliminate those threats before attacking strategic targets or whether we might skip such a campaign and attack the enemy's vital centers right away.

Because new weapon systems and tactical procedures continuously put current strategies to the test, we must neither stagnate nor allow air doctrines espoused by stronger countries to inhibit the development of defense theories adjusted to local and regional realities. No two countries are the same, and neither are their defense requirements. Beyond serving as a general reference, foreign doctrine usually has limited application to nations with military potential different than that of the country which promulgated it. Hasty adaptations have more negative than positive results for smaller states because they encourage expectations and expenditures misaligned with actual requirements.

In underdeveloped countries, an unbiased analysis of the situation can lead an air staff to discard a general theory that war automatically demands expenditure of scarce air assets on potentially superfluous operations. The basic question is, must we necessarily commit scarce, costly, and hard-to-replace aerial resources to fight for air superiority? If we quickly accept this requirement, would sufficient airpower assets then remain to carry out air attacks to paralyze, neutralize, or destroy opposing strategic targets and provide close air support to friendly ground forces? Could we carry out more operations to achieve those core goals in spite of the opposition that the enemy could present? That is, would we be able to reach and strike desired targets despite the opponent's air defenses? No doubt answers to these questions clarify the dilemma

of whether or not one always needs to battle for air superiority.

Reviewing some examples from military history might help us decide whether a given war requires us to respect the usual air superiority doctrine or seek some creative alternative. When two powers with strong modern air forces clash, one can assume that both possess air defense systems capable of inflicting serious losses on the other. Let us briefly review three recent examples.

Between 1965 and 1972, the Americans did not conduct a specific campaign to establish air superiority over North Vietnam, Laos, and Cambodia because US airpower could reach any spot over those territories and accomplish its missions as often as desired without taking unacceptable risks. Although significant casualties occurred, most involved helicopters and tactical aircraft. No dedicated air superiority campaigns against North Vietnamese air assets or air defenses preceded bombing strikes in Operations Rolling Thunder and Linebacker I and II. In fact the entire war was characterized by vast differences in the size, quality, and power of the opposing air forces. American superiority proved overwhelming against the limited North Vietnamese opposition, based on Soviet and Chinese equipment and doctrine. Soviet-supplied MiG aircraft seldom challenged American fighters and bombers except when US planes were laden with bomb loads.[1]

The second example comes from the Persian Gulf War of 1991, in which a coalition of more than 30 countries struck Iraq. Because Iraq had a strong air force hardened by an eight-year war against Iran, everybody expected the coalition to make air superiority its first priority. Operation Desert Storm included four air phases defined by their individual strategic goals, but these phases did not follow a sequential timeline. Lt Gen Charles Horner, the coalition air component commander, described the phases as follows: one (strategic air campaign), two (air superiority over the Kuwaiti theater of operations), three (battlefield preparation), and four (ground war).[2]

According to General Horner, phase two originated with Gen H. Norman Schwarzkopf of the Army but did not enjoy wide discussion within the air component because the latter deemed it redundant. Meanwhile Desert Storm became the first parallel air war in history when coalition forces conducted the first three phases almost simultaneously. Nevertheless, the war achieved ambitious strategic effects with minimal losses and synchronized the employment of all air and space assets operating in the theater.[3]

Gulf War target selection took place mostly at US Central Command rather than in Washington, as during the Vietnam War, and planners wisely exploited the technological surprise afforded by the F-117A Nighthawk, launching huge strike packages and decisively employing precision-guided munitions (PGM). Strategic air attacks, carried out in such a way that they resembled suppression of enemy air defenses (SEAD), paralyzed Iraqi command, control, communications, and intelligence, leading to the subsequent ineffectiveness, disarray, and destruction of Saddam Hussein's military forces, including his air force, whose performance proved less than impressive.

In this intense but short episode, phase one implicitly enabled the establishment of air superiority without the need to undertake a dedicated phase-two air superiority effort. The first phase intrinsically involved gaining the control of air and space that facilitated strategic strikes. Although coalition forces did not exclusively fight to win air superiority as a priority, they did not ignore it as a necessary condition and launched a condensed, multifaceted campaign that allowed them to enjoy air superiority's usual advantages.

A third case took place in the Falklands/Malvinas War of 1982, in which no plan for winning air superiority existed. Each side used its scarce air assets to attack enemy military targets and their mutually limited antiaircraft capabilities. Thus, neither side could gain air superiority, and both air forces relied upon courage to offset the absence of that advantage. Sometimes, to make up for that shortage, planners in the Fuerza Aérea Argentina (Argentine air force) used ploys, such as diversions and extremely low-altitude flights, to create tactical surprises and achieve positive results.[4]

The British tried to exploit their technological advantages. Despite suffering losses caused by superior British technologies such as AIM-9L air-to-air missiles, vertical-takeoff-and-landing aircraft, surface-to-air missiles, radar warning receivers, and so forth, Argentine flights still reached their targets repeatedly. In the Falklands/Malvinas War, neither side could undertake a dedicated air superiority campaign due to the theater's location, limited infrastructure, and lack of resources on both sides. Neither air force could conduct major SEAD operations although both knew how airpower should be employed.[5]

I believe that in this century we will see the gradual disappearance of dedicated air superiority campaigns and that airmen will have to go to battle with a different perspective. The fact that World War II–type wars are becoming less and less frequent confirms this belief. We currently express our inherent human aggressiveness through operational models different from those of the recent past, forcing strategists to reassess their operating environment.

I also believe that this change will require reeducating airmen to bring them into accord with the new political-military reality. We will have to revamp doctrinal concepts to accommodate matters of concern to military and political leaders. These new concepts, although only partially developed, will have strong repercussions in military-airpower thought. This complicated and inevitable updating process will demand the strategists' proverbial lucidity if it hopes to avoid interfering with other doctrinal concepts that we should keep because they remain current. Once again, brilliant minds will have a chance to excel by reexamining those dogmas that will determine airpower's role in future conflicts.

The latest military events in Afghanistan, Iraq, and other places offer a great deal of material for study. Because the initial lessons garnered by researchers still entail ambiguous conclusions, one must therefore regard them with caution. Thus, many airmen will continue to foresee the axiomatic need to battle for air superiority without assessing the peculiarities of each military situation. I am convinced that academicians will face a difficult task trying to correct the mind-set of aerial traditionalists and explain the reason for those doctrinal changes, but they need to start as soon as possible to keep air forces from falling behind the times. Aviation has always been at the forefront of events, and there is no reason to modify that tradition.

Readers should note that I am not opposed to exploiting the benefits that air superiority confers in any military circumstance. On the contrary, I believe that, given the appropriate balance of military forces, strategists should prioritize applications of offensive airpower to paralyze, neutralize, or destroy physical targets that will contribute to the attainment of military ends and strategic goals. Nevertheless, the choice between conducting an initial air superiority campaign and directly exploiting a reasonable preexisting ability to reach strategic targets will depend on careful examination of intelligence data. Desert Storm showed that nothing prevents the achievement of local air superiority from becoming an integral piece of the strategic campaign, but success or failure may well be determined by the quality of intelligence assessments. The practical way to achieve success will depend on each situation and the nature of friendly and opposing forces, which will determine the kind of operations carried out and their timelines.

The Military Air Problem in Second-Level Countries

Theoretically, when one plans an air campaign, the first step would entail determining what one should do to achieve the assigned mission and to analyze the type, quality, and amount of opposition confronted. Properly comparing and weighing all the opposing factors will suggest likely courses of action that should bring about the desired outcome. But it will be no simple task to build such a plan and execute it with efficient operations when the campaign begins. Before developing a plan, we will have to analyze the enemy's capabilities, but we cannot count on having intelligence data as complete and updated as we might like. Therefore, we would base that step on examin-

ing the best available estimates of the opponent's defensive capabilities and figuring out the most appropriate strike procedures.

The air assets of less-developed countries are generally small in number and not very sophisticated. Their combat aviation typically consists of a few dozen multirole aircraft outfitted with vintage technologies. Suppliers like to keep other countries below their own national capabilities, avoid arms races, and maintain a safe regional military balance. This means that neighboring countries will not have to confront unacceptable risks. Less-developed countries will be able to organize only incomplete air defenses characterized by gaps in radar coverage, a situation not conducive to efficient responses to incoming air strikes. This problem will work to the advantage of an enemy capable of achieving tactical surprise and may even allow multiple air attacks against key targets.

One must base any plan for air strikes inside hostile territory on current, accurate information. In small countries, air assets and weaponry are scarce; replacing them is difficult; substituting for them is costly; and trained crews are a luxury because training is limited. Therefore, one must plan every strike operation carefully to ensure the recovery of air assets, which such countries need for subsequent operations.

Success will most likely depend on inexpensive subsonic aircraft. At a minimum, a reliable aircraft should include a navigation and fire-control system, global positioning system, radar warning system, defense against surface-to-air missiles, and multifunction radar. Furthermore, it should carry approximately two tons of PGMs and a couple of self-defense air-interceptor missiles.

The availability of standoff munitions would greatly increase the threat posed by intruding aircraft. Air refueling—another desirable feature—would not be essential if the aircraft's combat radius were on the order of 1,000 kilometers. The aircraft would need to execute a high-low-high flight profile to evade enemy air defenses, although such a profile would entail high fuel consumption.

This short list of requirements will not fulfill every conceivable need planners may imagine, but it does offer useful guidelines. Because of the low number of combat aircraft in small air forces, one should plan each operation to almost guarantee that every aircraft successfully reaches and strikes its target. In these circumstances, it would be imprudent and unnecessary to commit country A's air force to a dedicated, preliminary air superiority campaign because country B would be in the same air superiority condition as A. Therefore, why battle to gain a condition that one can already exploit?

Country A's aircraft would have a high probability of reaching their designated targets without country B having the ability to stop the attack. Without any previous struggle for air superiority, country A's air staff might use its creativity to devise clever fragmentary orders to help its planes penetrate and neutralize the risk posed by country B's air defenses. A similar thought will occur to country B's air staff. What kinds of defense will country A use to counter any attack on its vital centers? Certainly their defenses will not exceed what country B has. Therefore, why should we believe that B will risk its meager resources to fight a meaningless air superiority battle?

We now turn to a clearer example. The air superiority situation faced in a notional confrontation between two great powers (countries C and D) would bear little resemblance to the one described for small countries like A and B. In a clash between large countries, the need for air superiority would arise with stark urgency. Each air force would probably have sufficient power to prevent the other from flying over its territory with impunity—a situation that might call for a preliminary air superiority campaign. However, for countries A and B, mutual freedom of action in the air would result from mutual weakness. Therefore, planners in countries A and B would have to devote a major effort to orchestrating clever penetrations of enemy airspace, casting aside the theory and doctrine learned from major air forces. They will simply need to apply their own methods, tailored to the reality of their resource-constrained situation.

Now I hope that my thoughts will become clearer when readers note that I do not reject a useful historical concept out of hand but argue that one should interpret it flexibly. This is why I urge an analysis free of any preconceived notions as a first step in the study of each conflict. Surely this method will help us understand how to employ air forces in second-level countries.

Other Realities

The use of doctrines designed for large-scale military operations will cause serious distortions if applied to countries like A and B due to the enormous gap in military potential. But some militaries from weak states express an inexplicable fascination with wars involving major powers. They aspire to imitate or even surpass the victorious forces of major powers, sometimes without assessing the conditions under which they would employ such forces. At first they begin to feel like the fictional partners of a country that has managed to crush the resistance of another nation barely three or four weeks after launching an aerial blitzkrieg that destroyed 85 percent of that country's strategic targets, including its aviation.

Although they are not major players, they enthusiastically share the victory and allow the doctrine that godfathered the resounding triumph to mesmerize them. They naïvely ignore the fact that powerful states fight in ways that correspond to their material capabilities but that minor states lag far behind in those capabilities. Therefore, smaller countries cannot have the same doctrine as powerful ones. But this does not mean that we discard everything powerful nations do or think. Every lesson taught in the major leagues of warfare deserves respect, evaluation, and adaptation to the minor leagues, where second-level professionals receive their education. Airmen from small countries should not seek a master's degree when they attend a high school (from the equipment standpoint).

As if there were not enough problems to solve, emerging strategic scenarios suggest the need for another review of current doctrine. The conventional twentieth-century wars that involved airpower, ranging from World War I to Kosovo, are being replaced by an assortment of clashes that more closely resemble persistent, dangerous domestic quarrels than traditional military confrontations. Nevertheless, those outbreaks have an unmistakable virulence derived from sociopolitical and economic issues almost as disturbing as the issues that provoked previous wars since they prompt the military involvement of major powers through multinational institutions and coalitions.

In such wars, the notion that one must always fight for air superiority constitutes only one dogma among many that are open to challenge. The whole theory and doctrine of conventional warfare become destabilized because the confrontation often occurs between a state and a nonstate actor, as in Chechnya, Colombia, Afghanistan, and Iraq, where the opponents against whom we might fight for air superiority lack air assets. Very seldom do these contenders own military air resources, even if they have a handful of vintage fighters or light civilian aircraft. In the latter case, the users will try to hide behind international civil-aviation regulations, even if they perform essentially military aerial missions.

In addition, one will not always encounter clearly defined enemy territories against which to send fighter-bombers to destroy strategic targets. Hostile areas often overlap areas that should legally remain under government control. Furthermore, violent outbreaks frequently occur in urban areas, where detecting enemy forces is very complicated and where strike aircraft cannot intervene without risking friendly casualties as well as undesired political effects.[6]

Under such strange circumstances, will air staffs still need to consider how to gain freedom of action in the air? A look at recent history suggests a decrease in that requirement. Illegal factions may organize a basic antiaircraft defense based on small-caliber automatic weapons and man-portable air defense systems that will prove lethal against low-flying planes. That sort of defense can shoot down aircraft because most of the fixed-wing and rotary-wing flights traverse open areas where the enemy

usually finds refuge from aerial incursions. Despite their sophisticated protection, the vulnerability of helicopters increases substantially when they have to operate in urban areas.

In guerrilla-occupied locations, one can omit fighting for air superiority due to lack of need—not because one questions the concept. When the state finds itself under attack by ground-based forces following the rules of guerrilla warfare, the air force has full control of the air without having previously engaged in combat. This premise does not exclude the risk posed by antiaircraft weapons the enemy might have; neither does it justify SEAD operations due to the small number and fleeting nature of very small mobile targets. Guerrilla-force air defenses do not offer meaningful opposition and do not prevent the government from exploiting air superiority. On the other hand, the air staff has to plan to support ground forces responsible for performing important operations. In such scenarios, special forces supported as needed by the other services will fight the battle on the ground.

Does this mean that by not having an opponent in the air, the air force will no longer have a main role in the battle? Absence of a battle for air superiority does not deny the valuable services aviation can provide. This force has much to offer in terms of offensive reconnaissance, tactical air transport, airborne command and control, psychological operations, close air support, combat search and rescue, and medical evacuation.

Neither can we overlook the development of unmanned aerial vehicles (UAV) for reconnaissance and long-range attack of surface targets. The US Congress has foreseen the participation of these vehicles in future US national defense strategy. Indeed, in the defense appropriation for fiscal year 2001, it called for the Department of Defense to "aggressively pursue and field remotely controlled combat systems with this goal: within 10 years one-third of U.S. military operational deep strike aircraft will be unmanned." To begin implementing that goal, Congress appropriated funding for the development of both UAVs and unmanned combat aerial vehicles.[7]

Second-level states with limited defense resources are far from incorporating advanced equipment into their arsenals, except for the more modest types. Once those new offensive UAV systems attain operational status in the Northern Hemisphere, they will revolutionize airpower doctrine. Two examples foreshadow the near future. Northrop Grumman's RQ-4A Global Hawk UAV has flown nonstop between the United States and Australia. It can fly as fast as 340 knots, reach altitudes up to 65,000 feet, and remain airborne as long as 35 hours.[8] The Defense Advanced Research Projects Agency, Boeing, and Lockheed Martin in the United States and Dassault Aviation in France are testing other UAVs. Those projects lead us to believe that soon we will have stealth UAV platforms that will reach their targets without having to wait for a successful campaign to establish air superiority.

Even though less-wealthy states will have to continue thinking for many years in terms of "historical" air operations due to their old-fashioned air resources, this does not mean that they must totally abandon their hopes of having some new technologies. Financial constraints can serve as an incentive to prompt national research consistent with domestic budgets. For example, the Argentinean organization CITEFA (Armed Forces Scientific and Technical Research Institute) is slowly developing a rotary-wing remotely piloted vehicle that might make for an interesting beginning.[9]

In "nonconventional" theaters of operations, we may see an operational environment that suggests the employment of few forces in reduced areas that lack target systems but have small, relatively valuable individual targets. But make no mistake. The change that we envision does not mean that we no longer need to keep and exploit air superiority. Though the new military environment differs from previous ones, we must retain the capability to wage conventional war as a backup option, which is not the same as saying that such wars will never happen.

Advice for Today's Airmen

To state that one never needs to battle for air superiority might raise angry accusations of betraying the doctrine that enabled the glory of airpower. But in a less-heated debate, the most stubborn orthodoxies will gradually give way in the face of evidence based on convincing experiences. Examples and exercises incorporating nonconventional factors will contribute to this outcome.

Open-minded, progressive strategists will more than likely gain the admiration and respect of researchers and scholars. It is imperative not to fall behind when updating doctrine, but this is not the first time that a need for change has disrupted the aeronautical family. Members of the aeronautical community should remember that aviation displays a strong predisposition to produce frequent, surprising events. Suffice it to recall that humankind required only 66 years to go from flying the first heavier-than-air craft to visiting the moon.

What was the main virtue of the prophets who accurately foresaw airpower's potential? They perceived how airpower might achieve decisive results in future wars, basing their ideas on reasoning and intuition rather than scientific formulations. That manner of acting need not change although the circumstances, of course, may differ from those of the "good old days." Once again we are trying to see beyond what modern air forces can do if they have reliable information and a degree of detail greater than that available in the early days of aviation. The important point is that we face substantial changes in the nature of armed conflicts. Therefore, we must demonstrate sound reasoning and understanding because the coming changes will push us to correct airpower theory without undermining its essence.

That, then, is the summary of my argument, in which I underline the need to perform a full analysis of the situation before deciding if we need to battle for air superiority. Professionals do not undertake efforts that will yield no profits yet will consume costly, scarce air assets. This places strong and weak countries alike at risk. The difference lies in the fact that the former can replace their losses with the aid of their industries and national finances. Mistakes have more serious consequences for weak countries since by squandering their air assets in unnecessary air superiority endeavors, they detract from other operations that also require airpower.

My ideas do not oppose the destruction of enemy aircraft, air bases, and supplies; rather, they diverge slightly from prevailing beliefs about the need to struggle for air superiority. This last decision entails a dedicated initial air superiority campaign because the enemy's aviation can curtail our own aerial freedom of action to strike key targets. On the other hand, we should omit an air superiority campaign when it serves merely to destroy enemy air assets for purely dogmatic reasons.

When the situation demands a fight for air superiority, we will have to devise plans for SEAD and the destruction of enemy air units in the air and on the ground. If no reason exists for an air superiority fight, we should carry out attacks against enemy air forces in parallel with strikes against other targets to strengthen the air freedom of action that we already possess. Therefore, planners have to think coolly without allowing objections from conservatives to intimidate them. A methodical analysis of the situation will reveal the best and most acceptable courses of action. To guarantee this goal, we will need to have a well-informed, open-minded intelligence service. An outdated, incomplete intelligence database will lead to faulty operations. In the air-and-space arena, such carelessness is very costly.

That is why the decision of whether or not to battle for air superiority is a heavy responsibility that one can neither delegate nor blindly adopt as if it were an inflexible requirement. In the air staff, the operations staff has to work very closely with the intelligence staff before proposing courses of action. It is very important that the operations staff have a clear understanding of the need to plan for or omit an initial battle for air-and-space control. Fighting for air superiority as an ultimate goal does not make sense if we do not intend to exploit it.

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Air superiority is a favorable condition that one can create directly or exploit in order to achieve subsequent strategic results. Again, I am not against that thought, but I am convinced that one must never waste scarce air resources by carrying out unnecessary operations. If country A can immediately strike the heart of its enemy, country B, with adequate aerial freedom of action, why get involved in an air superiority struggle? If country B is just as vulnerable to air attack as country A, it will have a weak defense of its own vital targets and will not present a strong defense. Presumably, A will satisfactorily accomplish its mission without undertaking redundant operations.

Incorporating this simple concept into doctrine and an air staff's routine would mark another step in the efficient employment of air assets since it would produce a better cost-profit ratio. In small air forces, a single fighter is probably tantamount to an entire air unit of a major air force, and this appraisal justifies its use against the most profitable targets. The initial cost of such an aircraft does not solely represent its military value. Second-level countries would have only a remote chance of replacing it during a war because they will likely face arms embargoes imposed by major countries.

Epilogue

I do not know if these arguments will achieve my aim—to open a debate on these doctrinal matters. If I can persuade readers to discuss the issue, I shall be happy even if they disagree with me. I am far from demanding full concurrence. Rather, I am trying to shake the dust from concepts that conformists have already filed in the attic of aviation history. There are too many variations in human conflicts for us to thoughtlessly accept the rules of engagement and doctrines that worked in past wars.

In spite of a substantial gap between small air forces and those of first-level powers, the former do not have to rely exclusively on doctrine passed on or suggested to them from abroad. For a long time, small air forces have observed events in far-flung countries and have yielded to the temptation to adopt the experiences of others, believing that by imitating them they would not need to develop their own doctrines. I acknowledge the beneficial effects of that habit, but it also has led to costly, uncorrected mistakes. Nevertheless, we still have time to change the tendency to believe that what is imported is perfect while what is homemade lacks quality.

Small air forces have to adapt themselves to their own environments and situations, taking advantage of what is useful and setting aside what is not. We have to discover our own cosmos and learn how to operate within it, optimizing what is available and usable. We must not allow ourselves to be mesmerized by prodigious mirages generously displayed by advanced states. Instead, we propose addressing our outlook to regional issues—the ones that we actually need to solve. ❑

Notes

1. See Earl H. Tilford Jr., *Setup: What the Air Force Did in Vietnam and Why* (Maxwell AFB, AL: Air University Press, 1991).

2. Tom Clancy with Chuck Horner, *Every Man a Tiger* (New York: Putnam, 1999), 274–75.

3. Ibid., 274.

4. See Comodoro Rubén Oscar Moro, *Historia del Conflicto del Atlántico Sur* (*La Guerra Inaudita II*) (Buenos Aires, Argentina: Air War School, August 1997).

5. Ibid., 4.

6. See Comodoro José C. D'Odorico, "La Guerra No Convencional" [Nonconventional Warfare] (Buenos Aires, Argentina, 2003).

7. *National Defense Appropriation Act of 2001*, Senate Report 106-292, 106th Cong., 2nd sess., *GlobalSecurity.org*, http://www.globalsecurity.org/military/library/congress/2000_rpt/sr292.htm.

8. "RQ-4 Global Hawk—High Altitude, Long Endurance, Unmanned Aerial Reconnaissance System," fact sheet, Northrup Grumman Integrated Systems, http://www.is.northropgrumman.com/new_fact_sheets/Northrop/Digital_press_kit/AFA/docs/global_hawk_fact_sheet.doc.

9. CITEFA is an organization headquartered close to Buenos Aires, Argentina. It is the civil-military center that evaluates and develops projects of interest to the Argentine armed forces. See J. C. D'Odorico, *Revista Aérea* (New York: Strato Publishing Co., 2001).

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Countering a Strategic Gambit

Keeping US Airpower Employable in a China-Taiwan Conflict

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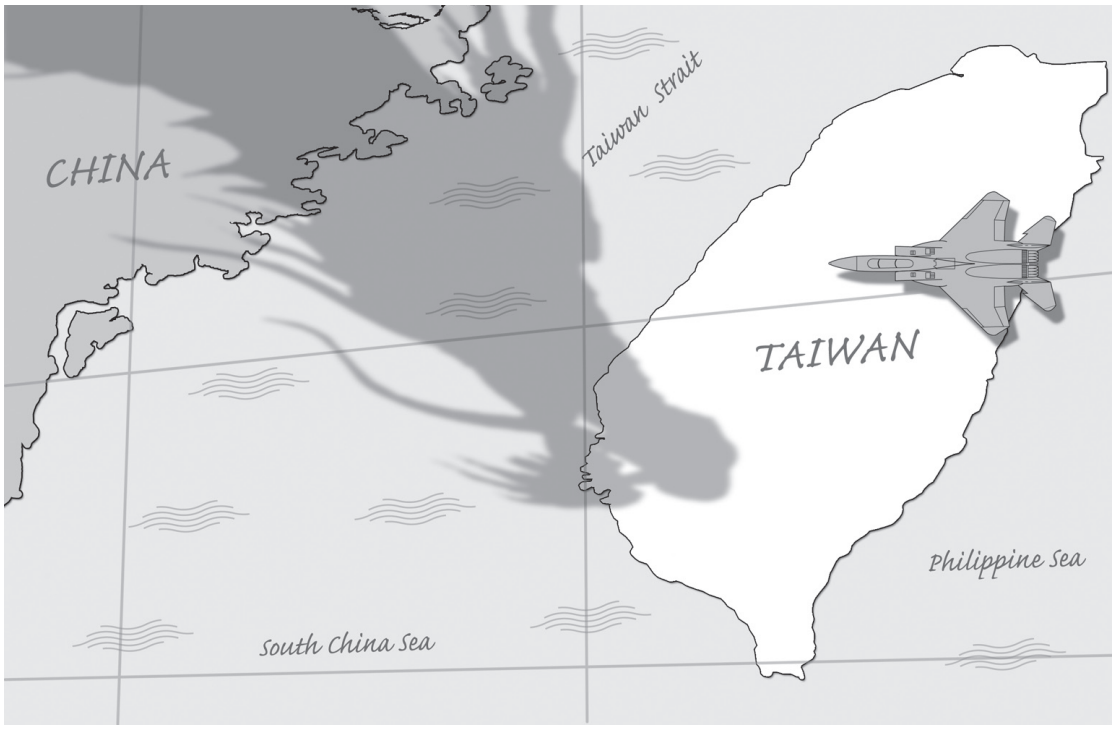
Editorial Abstract: The US ability to provide airpower to the Taiwan Strait area influences strategic decisions and discourages potential conflict. The author suggests that the United States use all instruments of national power in a Sun Tzu–like strategy to ensure its continued access to regional bases. Such a strategy should forestall conflict; failing that, US airpower would be positioned to help achieve desirable outcomes in case of conflict.



For to win one hundred victories in one hundred battles is not the acme of skill. To subdue the enemy without fighting is the acme of skill. Thus, what is of importance in war is to attack the enemy's strategy.

—Sun Tzu
The Art of War

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THE TAIWAN ISSUE remains a western Pacific flashpoint. The People's Republic of China (PRC) claims complete sovereignty over Taiwan and has promised to use force if peaceful means fail to keep Taiwan from pursuing independence. Taiwan, meanwhile, has witnessed a significant growth of proindependence forces in the last few years. The current Taiwanese ruling party's openly proindependence stance has challenged the PRC. Though cross-strait tensions have waxed and waned, the potential for conflict remains high. The United States has been involved in this situation since it began over 50 years ago and remains committed to both Taiwan's defense and finding a peaceful solution within the bounds of the 1979 Taiwan Relations Act.

By all measures, the PRC wishes to take Taiwan whole and intact. To this end, it will follow Sun Tzu's teachings to win without fighting, bringing every element of national power into full play. Chinese leaders see that a possible US intervention in a Taiwan Strait conflict will rely on a joint force dependent on naval power and airpower. In essence, the PRC has begun to shape the potential western Pacific battlespace using military, economic, and diplomatic means.[1] Though the People's Liberation Army's (PLA) growing strength has captured many analysts' attention, the force will remain, at best, a regional power for the foreseeable future. In fact, its growing power could be more of a ruse than a main threat in this situation. The PLA's growing power should be neither underestimated nor ignored by US policy makers. Still, for at least the near term, China will compensate for its limited military strength by pursuing a strategy using its growing economic power and careful diplomatic pressure on western Pacific nations to limit the United States' ability to deploy and employ airpower to defend Taiwan. Like Sun Tzu's axiom, the PRC's asymmetric gambit could subdue American airpower without fighting, crippling possible Taiwan strategies.[2] Ironically, the United States has seen a growing PRC economy and its recent, more kindly diplomacy as positive and hopeful leading indicators of further PRC market and democratic reforms. Hence, any credible, effective US response to these PRC initiatives must maintain the current cordial relationship with Beijing and encourage further PRC market reforms and more transparent governance while retaining military options guaranteeing Taiwan's already existing market economy and robust democracy.

The Ruse: The Growing PLA

As highlighted by the 2004 Pentagon report "on the current and future military strategy of the People's Republic of China,"[3] American policy makers have focused on the PLA's growth. Certainly, the PRC military options (especially as they relate to a potential Taiwan Strait confrontation) have grown in recent years with vast improvements in its military power. As the PRC applies its expanding economic power to military improvements, the threat occurs when the immature capabilities of Chinese armed forces combine with other elements of national power to secure regional dominance. While the world has been transfixed on Chinese military growth, the PRC's diplomatic and economic power has shaped the western Pacific area.

The nation's air forces are in the midst of a transition from large, 1960s-technology-based units to smaller, more modern, and capable forces.[4] Though the capabilities of the PLA Air Force (PLAAF) and PLA Naval Air Force (PLANAF) have traditionally centered on PRC territorial air defense, its acquisition and development programs have turned towards creating a power-projection force. New J-10 (Jian-10), J-11 (Jian-11/Su-27SK), and Su-30MKK (Su-27 two-seat variant) fighters each have increased range and an improved ability to carry air-to-surface weapons. To further improve its capabilities, the PRC has moved to acquire force-multiplying platforms for airborne early warning and control and aerial refueling, while continuing a search for strategic-airlift platforms and demonstrating an interest in unmanned aerial vehicles.[5] All told, the PLAAF

and PLANAF have revetments for approximately 1,100 aircraft within 325 nautical miles (nm) of Taiwan, though perhaps only 20 percent of its nearly 3,600 aircraft have the range to operate from these fields over Taiwan.[6]

The PLA Navy (PLAN) has also improved its capabilities since the late 1990s. It continues to expand a submarine force of over 60 boats, built originally around Soviet-era craft but increasingly centered on indigenously built conventional and nuclear boats. The PLAN has modernized its surface fleet by acquiring Soviet-designed *Sovremenny*-class guided-missile destroyers for enhanced antiship power, while also building its own *Luhai*-class destroyers to provide an improved anti-air-warfare capability. Its large frigate- and patrol-craft fleet possesses a formidable ability to engage enemy forces using antisurface missiles like the Russian-built Moskit and Styx and French-built Exocet missiles.[7]

Significantly, the PLAN possesses only a rudimentary capability to conduct large-scale assault operations across the Taiwan Strait. The PLAN has amphibious assault ships capable of transporting its two marine brigades and their equipment, around 12,000 troops, but little more. Though the PLA has three airborne divisions of about 10,000 soldiers each, the PLAAF does not have sufficient airlift capability to deploy the force.[8] Most assessments give the Chinese little chance of establishing the necessary sea control, air superiority, and favorable ground-force ratio required to complete a successful amphibious landing to reunify Taiwan.[9]

The PRC's large ballistic-missile force, the Second Artillery, provides the most credible offensive capability to threaten Taiwan. With over 500 short-range ballistic missiles based in the Nanjing Military Region across the strait from Taiwan, the PRC has been forecast to expand its arsenal of short-range ballistic missiles (SRBM) by 60–70 per year.[10] The Second Artillery retains the best capability for the PRC to strike such key targets in Taiwan as airfields; air-defense sites; naval bases; and command, control, communications, computers, and intelligence (C^4I) infrastructure with little or no advance warning.

Using these forces, the PRC has several difficult options to threaten Taiwan militarily. Though mounting a "traditional" full-scale amphibious invasion remains beyond the PLA's grasp, the PRC could attempt to coerce the Taiwanese people using missile and air attacks designed to undermine Republic of China (ROC) leadership and force the Taiwanese into reunification negotiations.[11] Another scenario might include a surprise assault by the PRC forces in a multidimensional coup de main, combining early surgical nuclear, chemical, air-assault, missile, and air attacks with follow-on amphibious assaults designed to decapitate the ROC leadership while confusing and demoralizing its military forces and population.[12] A third scenario considers an incremental PRC approach involving a phased invasion, whereby the PRC would first seize Kinmen (Quemoy) and other islands close to the Chinese mainland, moving then to the P'eng-hu Islands next to Taiwan before finally conducting a larger assault on Taiwan proper.[13]

Though impressive, the PLA's military buildup by itself does not give the PRC a credible capacity to force the resolution of a Taiwan conflict by military means alone. Each of the scenarios described above remains more a description of the possible, as opposed to the probable. The PRC can enhance its options and the effectiveness of its immature military by neutralizing the target (American airpower) without fighting.

The Target: Requirements for American Airpower Deployment and Employment

Should the United States be required to intervene in Taiwan militarily, its primary mission can be expected to match its national interest—that is, allowing a peaceful resolution of the situation. These efforts would most likely involve isolating Taiwan from follow-on PRC attacks and then either assisting the ROC military as it recovers from the attack or defeating PRC forces already lodged on the island.

The responsibility to isolate and secure the island from further PRC threats will fall to US naval and air forces. American forces would probably not attack the PRC forces on the mainland, except as required to secure their own safety from future attack.[14] Historically, US military forces have intervened in just this fashion to restrain threatening PRC actions, beginning in 1950, occurring again in 1958, and most recently in 1995–96.[15] In each of these cases, the American president chose to send US Navy aircraft-carrier battle groups to calm the waters between Taiwan and the PRC, separating the two sides to allow a peaceful resolution.

For the defense of Taiwan, its military retains a qualitative edge on the PLA in many areas, especially in naval and air forces, but in a long campaign without outside intervention, the PLA could overwhelm the relatively small ROC forces. The ROC has not yet developed the training and doctrine employed by the United States and its coalition partners to allow a smaller, qualitatively superior force to prevail over a larger force, especially in the area of joint, offensive operations. Its armycentric military has not moved beyond its traditional counterlanding mission to thwart the PRC advances in its naval, air, or missile forces.[16]

America's coercive capability in a potential PRC-Taiwan conflict depends on its ability to deploy and employ both naval and air forces for sustained operations in the skies and waters over and around Taiwan. Those deployments will depend on access to regional bases, its ability to deploy and then sustain the force at these bases, and the willingness (or unwillingness) of America's regional allies to support and assist an intervention. Deployments could be limited by American commitments to other theaters, as the United States must weigh its ability to maintain forces to other theaters while mounting a credible deterrent to aggressive PRC actions.

The foundation of American support for Taiwan remains its willingness and ability to deploy credible forces in a timely manner as situations worsen in the western Pacific. Though the United States possesses the world's most capable force-projection capability, that capability does have limits, especially in East Asia. Carrier battle groups require from three to 16 days to respond to any Pacific crisis; however, their aviation assets possess limited capabilities to sustain combat operations.[17] With few nearby airfields, the United States relied heavily on US naval aviation forces to sustain Operation Enduring Freedom. Carrier-based aircraft flew demanding sorties, often seven to 10 hours long, more than 400 nm from their strike group. To execute the long-range, long-duration missions, naval-strike aircraft depended on US Air Force tanker and intelligence, surveillance, and reconnaissance (ISR) assets to act as force multipliers.[18] Though US Navy/Marine Corps tactical-aviation assets flew about 75 percent of coalition sorties over Afghanistan, USAF heavy bombers delivered over 70 percent of the coalition's munitions tonnage.[19]

Unlike Operations Desert Storm, Noble Anvil, and Iraqi Freedom, where US-led coalition aviation benefited from the presence of numerous airfields in relatively close proximity to the theater of operations, any potential western Pacific conflict will have to be fought at distances more like those flown in Enduring Freedom over Afghanistan. As a matter of perspective, for Enduring Freedom, naval aviation assets often flew sorties into Afghanistan of over 400 nm one way, while refueling tankers based in Qatar flew over 1,100 nm. Based at Diego Garcia, US heavy bombers traveled over 2,900 nm, each way. During Desert Storm and Iraqi Freedom, Kuwait-based coalition forces flew much shorter sorties. Each way, those based near Riyadh traveled about 540 nm and those in Qatar flew around 610 nm.

The most effective US naval and air response to a cross-strait threat would combine the Navy's carrier battle group's rapid-response and force-projection capability with the Air Force's ability to dominate and sustain the fight, especially with its force-multiplying C^4ISR, aerial-refueling, and strategic-airlift assets. This joint-force synergy affords the US military the most credible, effective means to penetrate a battlespace close to the PRC's mainland and prevail. While naval forces possess the inherent ability to deploy anywhere, they operate better when employed with US

air forces that need fixed bases to operate. For operations in and around Taiwan, the United States would hope to use its bases on nearby Okinawa (probably Kadena AB, located approximately 350 nm from Taipei) and more distant Guam (probably Andersen AFB, located approximately 1,500 nm from Taipei) (see fig.).

Relying on just two facilities for USAF aviation assets would hamper US operations in support of Taiwan; American planners prefer more options. While most analysts would agree that US military forces would prevail in a conflict with PRC forces, the PRC could severely limit US options by keeping US forces away from the fight by denying them the use of nearby bases, cutting them off from getting in the game. Regional bases would also grant American decision makers more flexibility in the type of response they would consider to counter a PRC provocation. Given improvements in the PRC's ISR capabilities, Chinese decision makers could decide to act when American carrier battle groups were occupied with other contingencies or simply deployed to other Pacific areas. The PRC could gain considerable freedom of action by moving against Taiwan when US carriers were 14–16 days away, vice just three and one-half days when they are deployed to areas around Japan. Using the air-and-space-expeditionary-force construct, increasingly effective USAF land-

Figure. Air distances from Taipei

based air assets could close the window of vulnerability and narrow China's freedom of action by deploying to the western Pacific before far-flung naval assets could sail for Taiwan.[20] Losing the option to use multiple air bases in and around Taiwan would force US planners to rely more heavily on carrier-based assets, possibly limiting their availability for other contingencies.

The Real Threat: PRC Economic and Diplomatic Initiatives

The long-term PRC effort to shape the battlespace for a potential Taiwan Strait conflict will depend on its diplomatic efforts reinforced by economic influence rather than the direct use of military capabilities. The PRC's growing economy has increased its regional influence and fueled its military modernization. Since joining the World Trade Organization in 2001, the PRC has sustained gross-domestic-product growth rates of 7.5 percent (2001), 8.0 percent (2002), 9.1 percent (2003),[21] and 9.5 percent in 2004,[22] making it the world's third largest trading economy behind the United States and Japan. The Chinese news agency Xinhua reported in October 2004 that the PRC's total trade volume would exceed 1.1 trillion US dollars (USD) for 2004, while it maintained a favorable trade balance of approximately 10 billion USD.[23] As China increased its regional economic integration, several of its January 2005 top-10 monthly trading partners were important US partners and allies like Japan (third with over 14 billion USD in monthly trade), South Korea (fifth, over 7.7 billion USD), Singapore (seventh, over 2.2 billion USD), and Australia (ninth, 1.8 billion USD).[24]

The PRC's growing regional influence has created a chilling effect on regional support for Taiwan's independence movement. The PRC's public-diplomacy theme has centered on being a good neighbor for regional nations (the "peaceful" rise) in the new millennium, though the PRC has also been a demanding neighbor. Throughout 2004, China's leaders and diplomats secured statements from Pacific leaders (including several from Central and South America) reaffirming their belief in one China and their condemnation of any provocative Taiwanese moves towards separatism. Among these nations were several who could potentially provide air and logistics bases for US or US-led forces defending Taiwan, including Singapore,[25] the Philippines,[26] Vietnam,[27] Australia,[28] and New Zealand.[29]

Executing a broad campaign to isolate the Taiwanese separatist movement, the PRC countered every Pacific-nation meeting or communication with Taiwan with strong pressure for the third nation to affirm its commitment to a one-China policy while stating its opposition to Taiwanese independence. The PRC's efforts range from benign communiqués directed towards former US enemies like Vietnam[30] to strong open-press statements declaring that traditional American allies were not bound to defend Taiwan's sovereignty.[31] After PRC leaders met with Filipino leadership on bilateral trade, the Xinhua News Agency issued stock statements highlighting the Philippine government's support for a one-China policy[32] (air bases in Manila would be just 650 nm from Taipei).[33] Though Singapore's army has conducted regular bilateral training in Taiwan for years, the PRC turned its sights on the tiny island nation when its prime minister–elect visited Taiwan on a fact-finding trip in the summer of 2004. Singapore bowed to significant PRC pressure and strongly affirmed its adherence to a one-China policy and opposition to Taiwanese independence for disturbing East Asian stability.[34] Understandably, Taiwan's reaction to Singapore's snub was loud and harsh.[35] Singapore is located some 1,750 nm from Taipei and possesses a deep-water pier capable of berthing a US nuclear aircraft carrier.

Australia, a key US ally, has borne the brunt of Chinese efforts since the summer of 2004. The PRC moved to secure Australia's acquiescence during August 2004 trade talks held in Beijing. During the talks, Foreign Minister Alexander Downer indicated Australia was not bound to defend Taiwan. Im-

mediately, Australia's prime minister assured the world that Australia would uphold its obligations under the Australia, New Zealand, United States (ANZUS) Treaty.[36] Despite these assurances, the Australian government denied a request for a visit by a Taiwanese state minister just the next month, a strong indication of the importance Canberra places on not angering a prospective business partner in the PRC.[37] In February 2005, Australia also indicated it would not oppose the proposed lifting of the European Union arms embargo on the PRC.[38]

In the PRC's most assertive stance towards Australia, its director general for North American and Oceanic Affairs bluntly reminded Australia in March 2005 "to be careful" how it applies the ANZUS Treaty with respect to a potential PRC-US conflict over Taiwan. Australian prime minister John Howard, one of American president George Bush's strongest allies, shaped a carefully nuanced response, hinting Australia would support the United States in a conflict over Taiwan but downplaying Australia's responsibility by asserting such a conflict was unlikely.[39]

The friendliest voice for US plans has come from the Japanese government, which in February 2005 joined the United States in citing security in the Taiwan Strait as a "common strategic objective." Though formally noncommittal on the resolution of the disagreement, the Japanese shift comes at a time when Japan has signaled its desire to grow beyond its benign post–World War II status and take on a larger regional role. Though China remains one of Japan's most important trading partners, the PRC's assertive rise, combined with provocative North Korean actions, has driven the Japanese government away from its traditional pacifist stance. Unlike many Asian nations that still fear a resurgent Japan, Taiwan has been more receptive to Japanese assistance as a counterbalance to PRC pressure.[40] While the joint US-Japanese statement drew sharp criticism from Beijing, it signaled a Japanese willingness to support a US defense of Taiwan.[41]

The Counterstrategy: Balanced US Options to Neutralize the PRC's Initiatives

To counter the PRC's encroachment on US military options, American leaders must use Sun Tzu's guidance and attack the PRC's strategy. The United States should engage with Pacific-region nations beyond Japan using diplomatic, economic, and informational instruments of national power to retain military viability and flexibility. China has gained the advantage on the United States in its broad-based campaign vis-à-vis Taiwan with other Pacific nations. Any US counterstrategy will require a domestic, interagency, and multilateral approach to defend Taiwan's ability to resolve the conflict peacefully. The economic tool may be the hardest to apply in the Pacific region, given China's proximity and potential for growth. The United States may not want to limit Chinese economic growth, as it could provide an emerging market for US businesses and a good lever for continued engagement with the Chinese populace.

America's western Pacific foreign policy depends on balancing competing, often contradictory, nuanced requirements. While the United States seems to support the PRC claims to Taiwan by acknowledging "there is but one China and Taiwan is part of China,"[42] the United States also maintains a balance to the PRC claims by remaining committed under the 1979 Taiwan Relations Act to seek a mutually agreeable, peaceful resolution to the standoff and by resisting PRC coercion to determine Taiwan's future. Similarly, the United States recognizes that mainland China's growing economic power, if used reasonably, can be a positive force to facilitate regional economic development and foster internal democratic reforms inside the PRC.

Yet, the United States has remained skeptical about China's true ability to institute democratic reforms and has alternately seen the PRC as a strategic partner and a possible regional threat. Although the United States has encouraged China's burgeoning economy, economic growth supports the PRC's increas-

ingly threatening military power, thus allowing the PRC to threaten Taiwan with forced assimilation. To balance this threat, the American government has attempted to carefully calibrate its arms sales to keep the cross-strait relationship stable—neither providing too many arms (making Taiwan appear threatening) nor too few (leaving the Taiwanese at the PRC's mercy).[43] At the more local level, while increasingly intertwined PRC and Taiwan economies would seem to lower the threat of conflict on both sides of the Taiwan Strait, Taiwan's independence debate has grated on the PRC leadership and kept tensions high.

The PRC's hard-line stance on Taiwan comes in contrast to its other relations with the United States. Since 2004, the PRC's leadership has deliberately sought to avoid confrontations with the United States, stressing its own commitment to peaceful regional development and growth. The single exception to this softening "peaceful rise" policy has been about reunification with Taiwan.[44] To secure its territorial integrity over Taiwan, the PRC has used and will use its growing economic influence to challenge American relationships and build its own partnerships. It has already used its influence to coerce traditional American partners to distance themselves from supporting (or even considering) Taiwan's independence. The harsh PRC reaction to recent Japanese statements supporting a peaceful cross-strait resolution comes in sharp contrast to contemporary attempts between the two nations to find accord.

At its core, conflict over Taiwan exists at the intersection of three divergent national interests. The PRC, having staked great national pride and legitimacy in securing territorial unity, sees reunification with Taiwan as a vital national goal.[45] Taiwan, a separate entity since 1949, sees itself increasingly as a sovereign nation. As discussed above, the United States has walked a fine line, supporting a one-China policy while backing the Taiwan government to prevent aggressive PRC military actions.

Despite reluctance on both sides of the Taiwan Strait to use force in recent years, the specter of war cannot be wished away. Speculation has grown that the PRC will avoid pursuing the conflict to the detriment of its economy or while it sits on the world stage for the 2008 Beijing Olympics. Despite the pressure for peace, the Chinese have expressed their intense nationalistic sentiment over Taiwan with passage of the Anti-Secession Law in March 2005,[46] which signals the PRC's willingness to follow a rule of law, arguably lessening the possibility of a surprise attack on Taiwan. Yet, the law also gives PRC leaders the legal authority to act when they deem necessary. As a result, US policy makers cannot discount a PRC military response/intervention; therefore, the United States must remain prepared to exercise its military options.

Within this context of balance, US diplomatic and information efforts should be the most useful elements of US national power to counter the PRC's initiatives. Any US strategies should highlight Taiwan's growth as a vibrant democracy and stress the Taiwanese right to self-determination. President Bush's second inaugural speech served as a clear call for freedom around the world. The United States should invite other democracies to quietly, but firmly, support Taiwan's peaceful efforts to exercise its own democracy. These efforts could be very effective in Australia, Japan, and South Korea, given each nation's strong commitment to freedom, and would gain multilateral momentum as each nation stood up to support a fellow democracy.

Vietnam's historical antipathy for Chinese domination could be used to forge a stronger relationship with the United States. While not a natural US ally due to its authoritarian government and lingering antipathy from its long struggle for independence, Vietnam could be persuaded to work with the United States to retain a proper balance of power or influence in the region. Vietnam has already come into conflict with the PRC concerning rights to the Spratly Islands and might be expected to chafe under the influence of a more powerful China. Vietnam's well-documented distaste for Chinese domination might be greater than its anger at the United States over the Second Indochina War.

Neither can the United States afford to ignore its relationship with the Philippines, a relationship that has grown stronger during the global war on terrorism (GWOT). In September 2004, Philippine president Gloria Arroyo typified the balance required by the United States for dealing in the region when she stated her country's desire to retain its security relationship with the United States while developing economic ties with the PRC. US GWOT efforts have garnered significant goodwill in the Philippines, and it must continue to leverage that goodwill by stressing its commitment to regional stability and Taiwan's self-determination while developing its own economic ties in the archipelago.

While the US–Republic of Korea alliance remains a bulwark of both nations' defense policy, securing guaranteed South Korean assistance towards Taiwan would be problematic. South Korean defense policy remains understandably focused on its neighbors to the north. South Korea does not want to sour its relationship with the PRC, hoping the Chinese can exert a positive influence on Kim Jong Il and North Korea. As a growing regional power in its own right, the South Koreans will be reluctant to align themselves with the Japanese (due to remaining animosity from Japan's long Korean occupation) unless they perceive a greater threat from China. Due to these factors, gaining a solid commitment from the South Koreans for the United States to use their bases in defense of Taiwan remains unlikely.

For both Singapore and Australia, the United States must nurture already strong relationships to keep each of these governments from being isolated by the PRC concerning economic issues alone. The United States remains an important trading partner with each country but has also enhanced security relationships with both nations, especially since 11 September 2001. Both nations retain a dedication for regional stability and democratic self-determination. The PRC has already taken a heavy-handed diplomatic approach with both proud nations. The United States should augment its strong military and economic relationships with improved diplomatic and informational efforts to reassure Australia and Singapore and create a reasonable, viable alternative to an overly aggressive PRC.

The ultimate, best response to the PRC's gambit comes from simply recognizing the strategy. American policy makers should focus less on the PLA's growth and realize that the PRC can limit US military power without firing a shot. They should implement an integrated and multilateral—diplomatic, information, military, and economic—strategy to keep the use of military force viable and credible while still balancing US desires to advance the PRC's democratic and market reforms. Finally, Taiwan's leadership should realize that the American commitment to Taiwan's defense is not unconditional and that its ability to intervene is not unlimited. Attacking the PRC's strategy can allow the United States to subdue its enemy without fighting and allow a peaceful resolution between China and Taiwan. ❑

Notes

1. For an interesting perspective on how the PRC leadership may be using a different way of thinking about their strategic choices and methods in the western Pacific, see David Lai, *Learning from the Stones: A Go Approach to Mastering China's Strategic Concept, Shi* (Carlisle Barracks, PA: US Army Strategic Studies Institute of the US Army War College, May 2004), 28–31, http://www.carlisle.army.mil/ssi.

2. *Gambit* is defined by Merriam-Webster as a "a calculated move."

3. Secretary of Defense, *FY 04 Report to Congress: Annual Report on the Military Power of the People's Republic of China*, 28 May 2004, 1, http://www.defenselink.mil/pubs/d20040528PRC.pdf.

4. David Lai and Christopher Jones, "An Airpower Perspective on the China-Taiwan Tug of War" (unpublished manuscript, US Air War College, Maxwell AFB, AL, July 2004), 18.

5. Sergio Coniglio, "China's Aviation—A Military and Industrial Perspective," *Military Technology*, November 2004, 2.

6. "Chinese Airfields—An Overview," *GlobalSecurity.org*, http://www.globalsecurity.org/military/world/china/airfield-overview.htm (accessed 27 March 2005).

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7. Bernard Cole, "A Chinese Naval Assault against Taiwan: Capabilities and Prospects" (paper presented at the Fifth NDU Conference on National Security and Military Strategy, Republic of China National Defense University, 2005).

8. Richard L. Russell, "What If . . . 'China Attacks Taiwan!' " *Parameters* 31, no. 3 (Autumn 2001): 81.

9. Cole, "Chinese Naval Assault," 274.

10. DOD, *FY 04 Annual Report*, 49.

11. Lacy H. Bartee, "Possible U.S. Navy Responses to People's Republic of China Military Action against Taiwan" (master's thesis, US Army Command and Staff College, Fort Leavenworth, KS, 2 June 2000), 68–73.

12. Russell, "What If . . . 'China Attacks Taiwan!' " 80–82.

13. Piers M. Wood and Charles D. Ferguson, "How China Might Invade Taiwan," *Naval War College Review* 54, no. 4 (Autumn 2001): 58.

14. Therefore, discussions in this article will deal with aircraft ranges required for operations over Taiwan, not over mainland China.

15. US military forces intervened in 1950 to preclude the PRC advances during the initial Korean conflict, in 1958 to forestall PRC attempts to take the Taiwan Strait islands, and again in 1995–96 to counter the PRC missile tests and military exercises. David Lai, "The China-Taiwan Question: A Tug of War" (unpublished manuscript, US Air War College, Maxwell AFB, AL, 2003), 1–37.

16. DOD, *FY 04 Annual Report*, 47.

17. According to Bartee, these deployment times range from three and one-half days for a carrier in port in Japan to 16 and one-half days for carriers in port on the US west coast. "Possible U.S. Navy Responses."

18. Nearly 4,700 USAF tanker sorties were flown for Operation Enduring Freedom. Robert S. Tripp et al., *Supporting Air and Space Expeditionary Forces: Lessons from Operation Enduring Freedom*, RAND MR-1819-AF (Santa Monica, CA: RAND, 2004), 13, http://www.rand.org/publications/MR/MR1819/ (accessed 26 March 2005). Of the over 417 million gallons of fuel offloaded in Operation Iraqi Freedom, over 376 million gallons were offloaded by USAF tankers. T. Michael Moseley, *Operation IRAQI FREEDOM—By the Numbers* (Shaw AFB, SC: USCENTAF, Combined Forces Air Component, Assessment and Analysis Division, 30 April 2003), 7–8.

19. "The US flew roughly 6,500 strike missions and dropped about 17,500 munitions. Roughly 57% of the weapons dropped were smart weapons. The US Navy flew 4,900 of the 6,500 strike sorties flown, but delivered less than 30% of the ordnance. The US Air Force flew only 25% of the strike sorties flown, but delivered more than 70% of the ordnance used." Anthony H. Cordesman, *The Ongoing Lessons of Afghanistan: Warfighting, Intelligence, Force Transformation, and Nation Building* (Washington, DC: Center for Strategic and International Studies, 6 May 2004), 26–28, 85, http://www.csis.org/burke/hd/reports/afghanlessons.pdf (accessed 22 February 2005). See also Tripp et al., *Supporting Air and Space Expeditionary Forces*; and John Mazach, "The 21st-Century Triad: Unconventional Thinking about the New Realities of Conventional Warfare," *Seapower*, March 2002.

20. Indeed, USAF assets demonstrated their abilities in this area during Exercise Resultant Fury '05, a November 2004 demonstration where USAF bombers displayed a countersea capability in the western Pacific.

21. "Economic Data," *Economist*, 13 May 2004, http://www.economist.com/countries/China/profile.cfm?folder=Profile%2DEconomic%20Data (accessed 18 February 2005).

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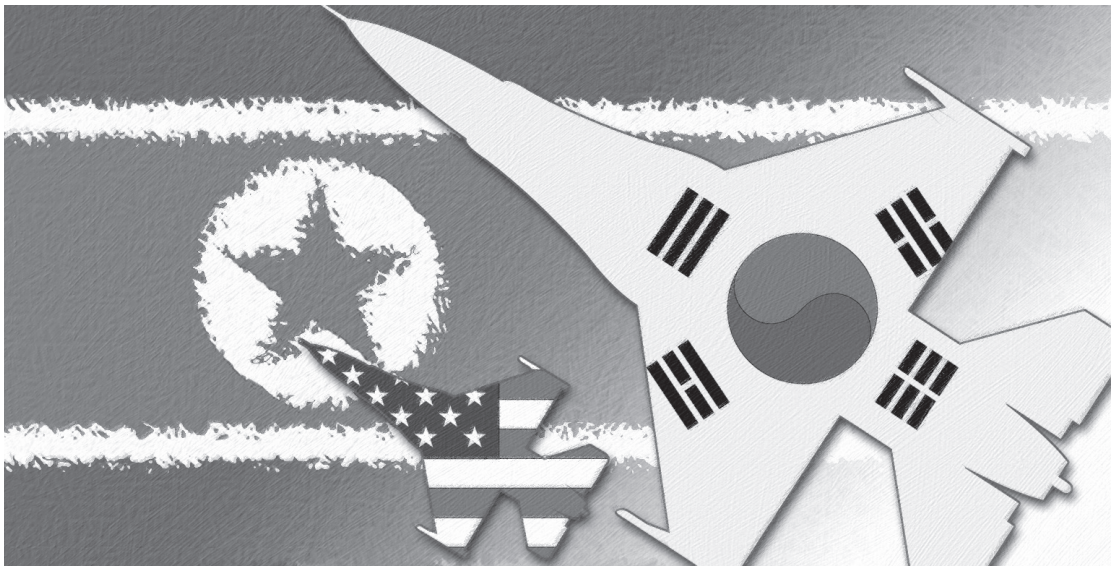
The Future of US Airpower on the Korean Peninsula

Dr. Bruce E. Bechtol Jr.

Editorial Abstract: US military support to the Republic of Korea (ROK) remains critical to peace and stability. The author details constraints faced by the army of the Democratic People's Republic of Korea (DPRK) in any attempt to invade the ROK. Although much of the surface-based defense capability in the South is transitioning to the ROK army, a strong US airpower presence demonstrates US commitment to Korean security, counterbalances the DPRK's offensive systems, and deters war.



SINCE THE SUMMER of 1950, US airpower has remained one of the dominant military forces on the Korean Peninsula. Through the Korean War, the Cold War, the uncertain post–Cold War era that has existed since the fall of the Soviet Union, and the transition of power in North Korea from Kim Il Sung to his son, Kim Jong Il, the ability of US airpower to serve as a key pillar of deterrence to forces that threaten the stability and security of the Republic of Korea (ROK) and the ROK-US alliance has remained unquestioned. In a transforming geopolitical landscape and a rapidly evolving region, this is unlikely to change in the future.

Many issues relating to the disposition of US forces in Asia—Korea in particular—are relevant to any discussion regarding the future of air forces on the peninsula and surrounding areas that would find themselves involved in a conflict or major military operation during a crisis. Among the most important of these is the evolving North Korean threat. This article analyzes that threat and its development

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over the past decade. Because the threat from North Korea has indeed evolved, one must also conduct an analysis of how the United States can best support its ally South Korea in a time of crisis and examine why airpower represents a more important element of this equation than it has in the past. Equally important, the article considers how transformation in the US military and within its forces in Korea has changed the role of US airpower as it relates to the ROK-US alliance, as well as how recent concerns of both Seoul and Washington have altered the paradigms of the ways in which our military forces can best support the South Korean military in a crisis or full-scale war. These issues have all come to the forefront since the nuclear confrontation with North Korea heated up in the fall of 2002.[1]

The Evolving North Korean Threat

In order to address why US airpower has become such an important deterrent to the North Korean military threat, one must first note how that threat has changed. During the 1990s, North Korea—a nation of 22 million people—boasted the world's fifth largest military (fig. 1). Its army fields 3,700 tanks, 3,500 armored personnel carriers, over 4,000 self-propelled artillery pieces, and nearly 800 aircraft.[2]

Since subsidies from a collapsed Soviet Union ceased at the end of the Cold War, North Korea has faced the absolute impossibility of maintaining the readiness and capabilities of a military (with a large, mechanized army as its core) poised to attack South Korea with the goal of achieving unification under the communist regime in Pyongyang.[3] Maintaining a sizable military dominated by mechanized forces and self-propelled artillery in a high state of readiness requires a substantial amount of fuel for the field training of these forces. Feeding them also stands as a daunting task, especially since food (as well as fuel) has remained in drastically short supply in North Korea since the early 1990s.[4] Furthermore, in any invasion scenario, North Korea's military would have to flow south through two key narrow invasion corridors—the Kaesong-Munsan and the Chorwon Valley (the east-coast approach would support only a small-scale flow of forces) (fig. 2).[5]

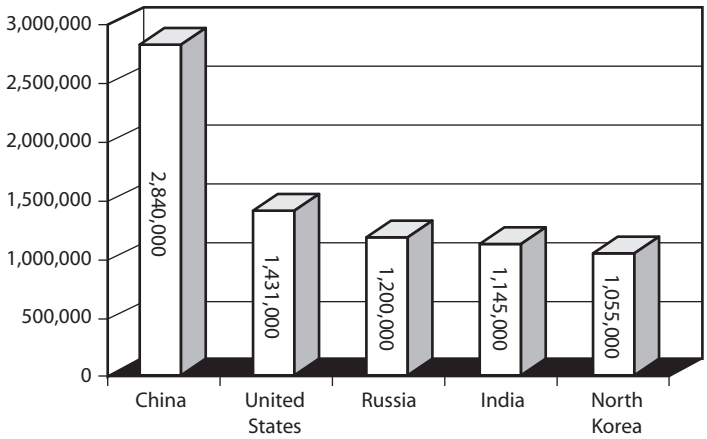

Figure 1. The world's five largest militaries. (Reprinted from *The Military Balance, 1997/98* [London: International Institute for Strategic Studies, 1999] and included in a report to the Speaker of the House of Representatives by the North Korean Advisory Group, a special organization formed in the House to review problems unique to the national security policy of the United States as it relates to North Korea, November 1999, released to the public in written form, 29 October 1999.)

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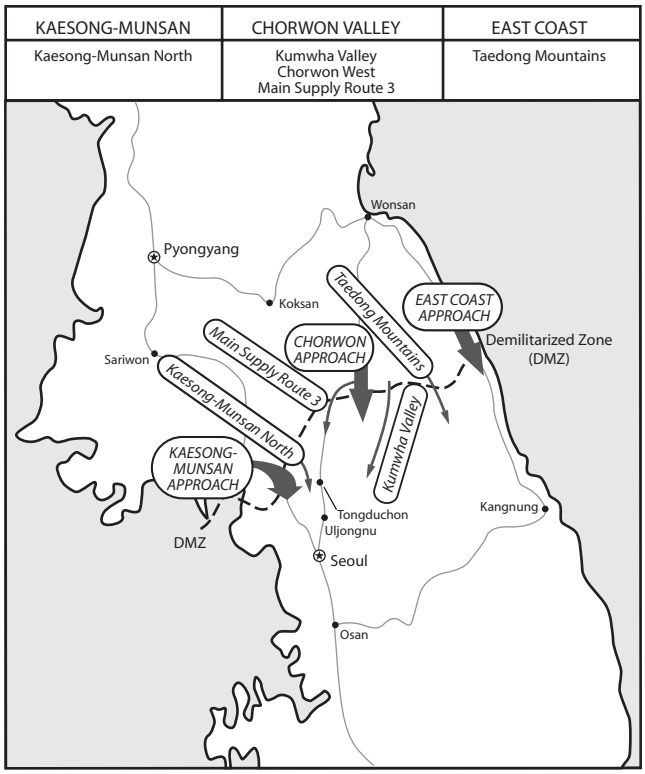

Figure 2. Avenues of approach. (From ROK Ministry of National Defense, 2001.)

A full-scale invasion through north-south approaches in narrow corridors by mechanized and self-propelled artillery forces would need support from a modern air force capable of keeping modern US and South Korean aircraft from destroying ground forces as they attempted to navigate roads into the south. Unfortunately for Pyongyang, its air force has received almost no upgrades since the late 1980s, and minor purchases such as the acquisition of 40 MiG-21s from Kazakhstan in 1999 have not led to any real advances in the capabilities of North Korean airpower.[6] Additionally, North Korean pilots are lucky to get 20 hours a year of flight time (probably because of the same lack of fuel that bedevils mechanized, armored, and self-propelled artillery forces), a situation that further diminishes the readiness of their less-than-modern air force.[7] A report on commercial satellite photos released by the Japanese press in 2005 revealed that "90 percent of North Korean military aircraft are Korean War vintage [and that the] newest fighters were those supplied in 1984 and 1988 by the Soviet Union."[8] Although perhaps exaggerated, the press report does point to a challenge faced by the North Korean military: it would have grave problems providing air cover for any invasion force into South Korea.

In light of the information discussed above, one wonders whether the threat from North Korea has diminished if that country has undergone a severe degradation in its capability to mount a successful invasion of South Korea with conventional military forces. The likely answer is no. Indeed, as Pyongyang's capability to make war on the South using conventional maneuver forces lessened, the regime began to concentrate on a new capability—threatening South Korea (and ultimately the region) with asymmetric forces. Since the mid-1990s,

when Pyongyang realized it could no longer maintain previous levels of readiness and capabilities in its armored and mechanized forces, the regime has apparently focused on weapons and capabilities that continue to threaten the security and stability of the government in Seoul but do not severely drain its dwindling resources. This asymmetric triad of forces includes long-range artillery, missiles, and special operations forces (SOF).

Since the mid-1990s, North Korea has moved more than 500 self-propelled, long-range artillery systems to areas just north of the demilitarized zone (DMZ), at least 300 of them at sites that could literally target areas in and around Seoul on a moment's notice and potentially kill hundreds of thousands.[9] Indeed, the South Korean Defense Ministry's latest version of its defense white paper noted that North Korea's ability to maintain old equipment had hit a wall, with the number of military tanks and armored vehicles declining (because a lack of fuel and electricity hindered Pyongyang's maintenance of its armament industry and production of spare parts). The report also noted, however, that North Korea had increased the number of artillery pieces in its arsenal by 1,000 since the year 2000—a significant improvement.[10] Thus, as one capability to threaten South Korea declined during recent years, the North Korean military replaced it with another one in many ways just as lethal.

Also disturbing is North Korea's development of super-long-range missiles such as the Taepo Dong and the recently disclosed Taepo Dong X, both of which will eventually (if not already) be able to hit parts of US territory.[11] But Scud missiles already deployed in North Korea constitute the main threat to the security and stability of the South. Estimates suggest that Pyongyang already has at least 500 of them in its inventory and that some or all of them can carry chemical warheads.[12] The North could use these missiles concurrently with the long-range artillery already deployed along the DMZ, with little or no warning, adding significantly to what would amount to an already substantial casualty count on the first day of a war.

Finally, North Korea's well-trained SOF cadre, estimated at up to 100,000, stands as the world's largest. Unlike many of the forces in North Korea's resource-constrained military, these have not suffered from a lack of fuel or food. They train year-round and have not experienced the decline in training evident in many of the conventional forces in Pyongyang's arsenal. In addition, North Korean SOF personnel can practice paradrop training from towers as well as aircraft, the former obviously not constrained by limitations on fuel and/or flight time. In wartime, large numbers of these forces could attack key command-and-control nodes, air bases, or any other high-value target in South Korea. Perhaps equally disturbing, they could also conduct unconventional operations or even terrorist acts that would severely disrupt morale and alter public opinion in both South Korea and the United States. Most likely, the more than 300 AN-2 Colt (World War II vintage) aircraft in North Korea's inventory would insert these forces into South Korea. Reportedly, North Korea has made a concerted effort to keep its arsenal of easy-to-fly AN-2s well maintained.[13]

The evidence shows a clear change of direction that began when North Korea's armed forces began to decline during the 1990s. Pyongyang has shifted from building and maintaining a conventional capability that would ultimately overrun and conquer South Korea to establishing one that threatens all or most of Seoul—and eventually disrupts or threatens the security of much of the remaining landmass in the south. This tack accomplishes many of the same initial objectives. By severely degrading Seoul and destroying or damaging much of the landmass and/or population of South Korea, North Korea could reduce a country boasting the world's 10th largest gross domestic product to third world status.[14] Thus, Pyongyang can threaten South Korea's very way of life and, ultimately, its national security. Although the spectre of violent reunification has dimmed, the prospect of violent war and destruction of life as most South Koreans now know it has not. Therefore, deterring North Korea is just as important as ever. One must then determine

how the United States and South Korea can best defend against the evolving North Korean threat.

Answering the Threat: Why Airpower Is Key

Although North Korea appears to be experiencing a decline in its ability to launch massive, mobile, mechanized forces deep into South Korea, it is still able to directly threaten Seoul and severely damage other parts of the country. As discussed earlier, Pyongyang cannot easily flow forces south through the two principal invasion corridors because its air force cannot match the United States' and South Korea's more modern airpower. The South Korean air force currently boasts 153 F-16s, 185 F-5s, and 135 older F-4s.[15] In addition, South Korea is currently purchasing 40 advanced F-15K American-made aircraft that it will fully integrate into its arsenal by 2008.[16] Arguably, however, aircraft provided by the US Seventh Air Force represent the most important factor in the suppression of North Korean airpower. Several squadrons of US F-16Cs and F-16Ds as well as A-10s (ideal for taking out massive formations of armor and self-propelled artillery) can deter large-scale North Korean forces from successfully executing an invasion—and quickly destroy most or all of North Korea's air bases (fig. 3).

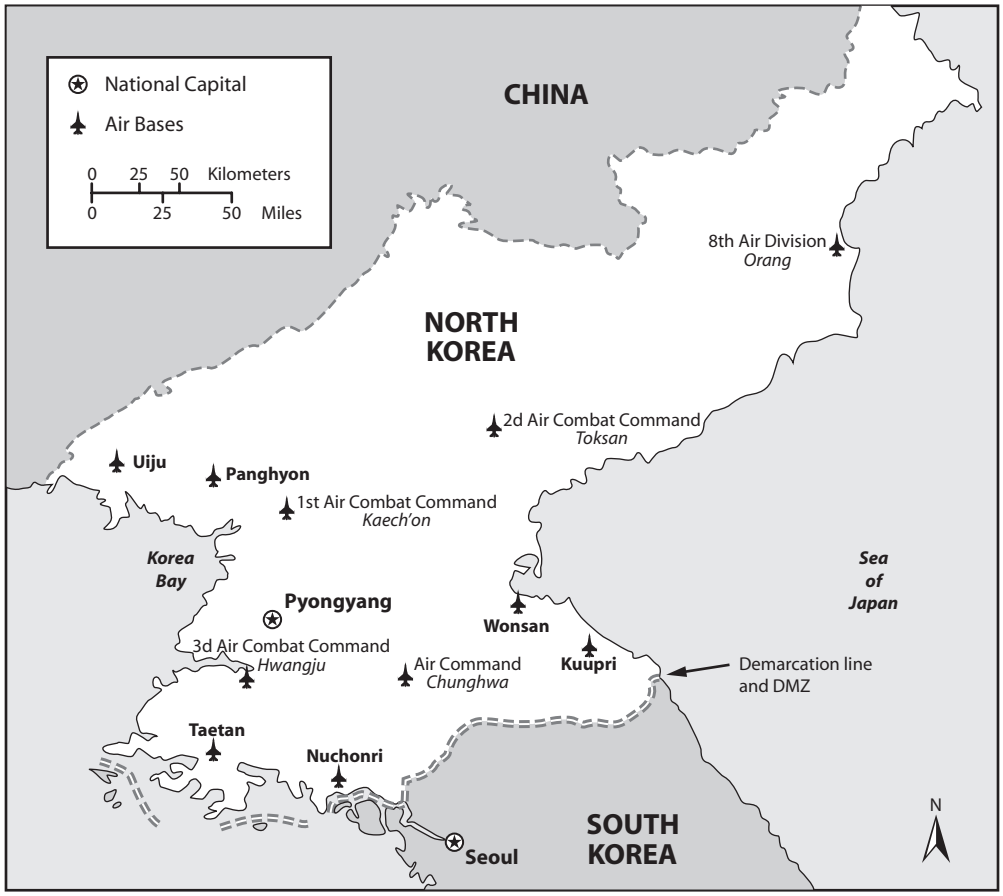

Figure 3. North Korean air bases. (From ROK Ministry of National Defense, 2000.)

Clearly, US and South Korean airpower serves as a strong deterrent against the traditional aggression that North Korea wanted to initiate prior to the economic collapse that put its formidable armored and mechanized forces into a state of decline. But airpower also would play a major role (perhaps an even more important one) in stopping aggression from North Korea's asymmetric capability that built up during the 1990s.

As discussed previously, North Korea has now moved a large number of long-range artillery systems close enough to the DMZ to threaten virtually all of Seoul and many areas of Kyongi Province (the northernmost province in South Korea; it contains the largest concentration of that country's ground forces) with little warning time to US and ROK forces. Currently, the ground-based mission of providing counterfire to this long-range artillery falls to the 2d US Infantry Division, which operates 30 multiple-rocket-launcher systems and 30 M109A6 Paladin self-propelled howitzers. During April 2005, as part of the ongoing shift of defense responsibilities on the Korean Peninsula between South Korean and US forces, leadership announced that the South Korean army would assume responsibility for this mission. Integration of South Korean units into the combined ROK-US command, control, communication, computers, and intelligence (C4I) system on the peninsula will be key to the success of this new mission.[17] Regarding the current state of readiness of South Korean forces on the peninsula, however, the United States has concerns about the unwillingness of Seoul to spend money to upgrade its own C4I infrastructure—or to help with the costs of the current structure.[18] Integrating these newly assigned units into a modern C4I system is vital because of the importance of quick reaction time in pinpointing North Korean artillery units with radar and destroying them before they fire or shortly thereafter.[19]

Even if all of these systems could operate at peak efficiency and immediately integrate effectively into current or future C4I infrastructures, they would still need heavy augmentation by effective airpower in both their offensive and defensive postures. North Korea simply has more long-range artillery systems deployed along the DMZ than ground-based systems could destroy all at once—particularly in a first-strike scenario. Of course, this is exacerbated by the concerns about C4I, which will probably remain an issue in ROK-US alliance talks for the foreseeable future. Thus, in terms of the first element of North Korea's asymmetric triad (long-range artillery), airpower will continue to play an essential role in deterring and destroying that threat. Because of the unique and unmatched capability of US fighter and attack aircraft to suppress this type of target, American airpower has become extremely important to countering this growing threat—and will likely remain so for many years as Seoul continues to upgrade its C4I and airborne-strike capabilities.

Regarding the second element of the triad (missiles), US airpower is an absolutely vital deterrent, now and in the future, against a first strike by the North Koreans, who have a large number of dispersed missile facilities (as well as mobile launchers, which they have not only deployed but also proliferated to other nations, such as Syria).[20] In case of war, ROK-US forces would need to take out Scud missile sites and launchers as well as longer-range missiles because North Korea might use the latter to launch a retaliatory strike at Japan (perhaps at US bases located at Okinawa or elsewhere) (fig. 4). To do so, the US Air Force would use its assets on the Korean Peninsula (Seventh Air Force), in Japan (Fifth Air Force), on Guam (bombers), and elsewhere in Pacific Air Forces, where US airpower possesses unique and vital capabilities for the defense of the Korean Peninsula.[21]

US airpower will continue to play a key role as well in countering special forces, the third element of North Korea's asymmetric triad. Clearly, US Air Force aircraft would figure prominently in the suppression and destruction of North Korean airfields, from which platforms (most of them AN-2s) carrying SOF troops would deploy, and in support of the South Korean air force's aerial interception of enemy transport aircraft conducting paradrop missions into the South. But this represents only part of the story. Because North Korea

Figure 4. North Korean missile sites. (From ROK Ministry of National Defense, 2003.)

has far more SOF troops than aircraft to carry them, many of these forces would attempt to infiltrate South Korea through weaker areas of the DMZ. Two such locations include the inter-Korean transportation corridors, where roads and rail lines are being repaired for future transportation routes and where barbed-wire barriers and mines have been cleared away (fig. 5). Airpower would track and kill attempted infiltrations through these zones.

Another extremely important factor in answering the asymmetric threat (particularly as it relates to airpower) involves the suppression of North Korea's old (dominated by SA-2s) Integrated Air Defense System (IADS) to permit strikes on facilities deep in North Korea.[22] Pyongyang has made efforts to adapt this system to modern allied capabilities, sending observers to Serbia during Operation Allied Force and possibly integrating some relatively inexpensive, new-generation, infrared-guided surface-to-air missiles into its air defense network.[23] In fact, experts have recently maintained that the presence of these missiles means that Pacific Air Forces will need the new F/A-22 to "knock down the door so the rest of the forces can flow in."[24] Modern US airpower, flying with our allies, will carry out this IADS-suppression mission—an important

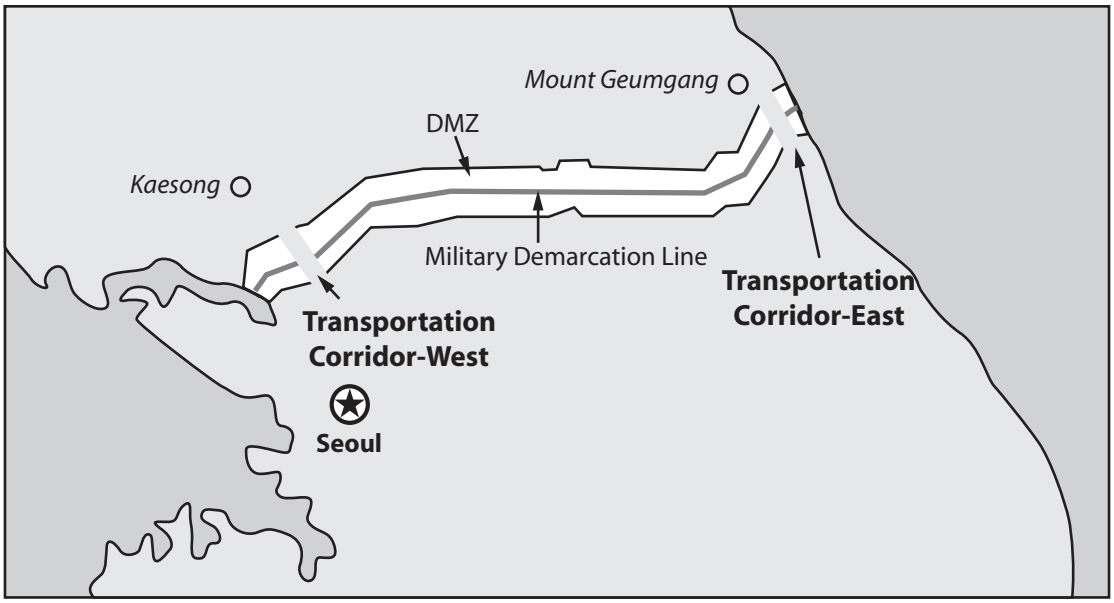

Figure 5. Inter-Korean transportation corridors. (From *Statement of General Leon J. LaPorte, Commander United Nations Command, Commander, Republic of Korea–United States Combined Forces Command and United States Forces Korea before the 108th Congress House Armed Services Committee*, 12 March 2003, 108th Cong., 1st sess., http://armedservices.house.gov/openingstatementsandpressreleases/108thcongress/03-03-12laporte.pdf.)

part of the destruction of North Korea's tripartite asymmetric threat.

How Will Transformation Change the Role of Airpower on the Korean Peninsula?

Transformation has come to the Korean Peninsula. The Global Posture Review has prompted a major reduction in the number of ground forces in Korea, and plans call for a withdrawal of 12,500 American troops from Korea (mostly ground forces) by the end of 2008. In addition, Headquarters Command for United States Forces Korea/Combined Forces Command is scheduled to move most of its infrastructure and personnel south, to Camp Humphries (near the city of Pyongtaek) during the same time period.[25] The primary American ground forces in Korea, the 2d Infantry Division, should transform into a next-generation combat unit during the summer of 2005, becoming a "unit of employment X" two years ahead of schedule.[26] Furthermore, numerous command and funding issues in the ROK-US alliance will remain in flux during completion of the ongoing moves, but a discussion of those matters lies beyond the scope of this article.

One must then consider the question of how all of this affects the role of airpower on the Korean Peninsula. The answer is obvious. The ROK-US alliance will now rely more than ever on the unique capabilities of US airpower to deter the North Korean threat. In fact, with all of the effort under way to reorganize US Army forces on the peninsula and move ground-combat units, headquarters facilities, and personnel south, the disposition of US Air Force units has remained relatively unchanged. Gen Leon LaPorte, commander of US Forces Korea, recently stated that the mission of our forces in Korea remains clear (despite taking on a regional role): to defend

South Korea against an attack from the North. He also discussed US plans to improve combat capabilities by spending $11 billion over the next three years and to establish five or six Stryker brigades focused on the Pacific region that could deploy to Korea quickly.[27] But US forces—especially airpower—remain the best way of enhancing security on the Korean Peninsula. Indeed, in 2003 former Georgetown University professor (and current senior member of the National Security Council) Victor Cha observed that the most reasonable arrangement for the alliance would entail an increased emphasis on US naval and airpower presence with a reduction in ground forces. We are now seeing this happen.[28]

Conclusions

The threat from North Korea has evolved but remains no less ominous either to US interests or to those of Washington's important allies South Korea and Japan. Because the threat and geopolitical situation in Asia have changed and, perhaps just as important, because the US military is now transforming, traditional paradigms regarding how we face threats throughout the world no longer apply in many cases—such as Korea.

Although a large, forward-deployed ground presence on the Korean Peninsula may no longer be necessary, providing military support to the ROK-US alliance remains as important as ever. In fact, the deterrence provided by a strong airpower presence continues to have an effect on our enemies, as evidenced by a manual published by the North Korean People's Army in 2004, which warns that the United States will target North Korea's military leadership during a time of war.[29] The types of US forces that support freedom in South Korea have changed, but Washington's commitment to the security of that country has not. For the foreseeable future, airpower will continue to play a major (and now a more prominent) role on the Korean Peninsula. ❑

Notes

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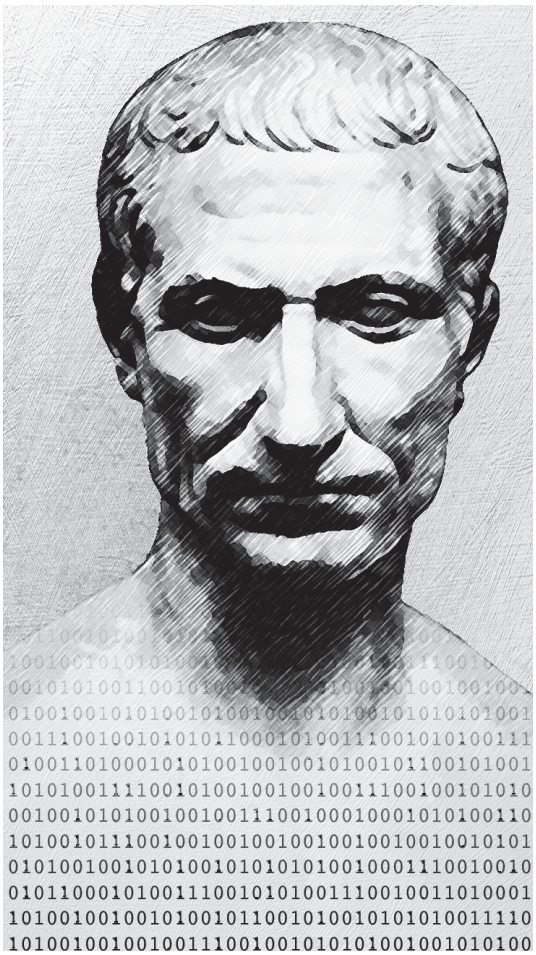

Toward Information Superiority

The Contribution of Operational Net Assessment

Dr. Peter W. Wielhouwer*

Editorial Abstract: Dr. Wielhouwer notes that achieving decision superiority hinges on information superiority. He introduces the concept of operational net assessment, as well as its process and product, identifying them as enablers of effects-based planning and effects-based operations. The synergy of these tools provides joint force commanders extensive information in advance of a crisis, leading to actionable knowledge and decision superiority that facilitate the effective application of diplomatic, economic, informational, and military power.

During the short part of summer which remained, Caesar . . . resolved to proceed into Britain. . . . He thought it would be of great service to him if he only entered the island, and saw into the character of the people, and got knowledge of their localities, harbors, and landing-places, all which were for the most part unknown to the Gauls. . . . After having called up to him the merchants from all parts, he could learn neither what was the size of the island, nor what or how numerous were the nations which inhabited it, nor what system of war they followed, nor what customs they used, nor what harbors were convenient for a great number of large ships.

He [sent] before him Caius Volusenus with a ship of war, to acquire a knowledge of these particulars before he in person should make a descent into the island, as he was convinced that this was a judicious measure.

—Gaius Julius Caesar
The Gallic Wars, Book 4

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*Portions of this article rely heavily upon several US Joint Forces Command publications, including "A Concept Paper for Operational Net Assessment" (Norfolk, VA: US Joint Forces Command, May 2004); *Operational Net Assessment Concept Primer* (Norfolk, VA: US Joint Forces Command, October 2003); and *Doctrinal Implications of Operational Net Assessment (ONA)* (Norfolk, VA: Joint Warfighting Center, US Joint Forces Command, 24 February 2004). I am grateful for careful review from Carl Schone, Gary Atkinson, and Charles Ferguson. Any remaining errors are my own.

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IN LATE SUMMER of 55 BC, Julius Caesar needed actionable knowledge. He knew that the quality of intelligence at his disposal was inadequate as he prepared for invading the British Isles, and he understood that he should judiciously gather as much information as he could. He identified what he needed prior to planning for action—information about the people, their war-fighting system, their character and customs, their military assets (such as harbors and the geography of the island), and ways of using those assets for his intended efforts. To acquire this information, Caesar tapped into multiple sources—some not helpful (a multinational corporate contingent) and others more fruitful (military intelligence).

Times have changed, but they haven't changed that much. As Caesar and generations of military leaders have understood, knowledge is central to effective war fighting. Joint force commanders require timely, relevant, and actionable knowledge in advance of military operations, and the scope of information required today boggles the mind. As a consequence, the needs of contemporary data processing challenge the effective synthesis of information.

For that reason, *Joint Vision 2020* identified information superiority as a key enabler of the US military's full-spectrum dominance. Defined as the capability to collect, process, and disseminate an uninterrupted flow of information while exploiting or denying an adversary's ability to do the same,[1] information superiority is facilitated by continued advances and proliferation of communications and information technology.[2] Still, the concept "provides the joint force a competitive advantage only when it is effectively translated into superior knowledge and decisions. The joint force must be able to take advantage of superior information converted to superior knowledge to achieve 'decision superiority.' "[3]

The services' doctrines and transformation plans have further developed the vision of information superiority articulated by the Joint Chiefs of Staff. Air Force doctrine, for example, identifies information superiority as one of that service's distinctive capabilities.[4] *The U.S. Air Force Transformation Flight Plan* specifies information superiority as a key enabler of joint and service transformation, supporting such concepts as effects-based operations (EBO), parallel warfare, and decision-cycle dominance.[5] United States Joint Forces Command (JFCOM) has developed operational net assessment (ONA) as an advanced, coherent knowledge environment and integrated tool that serves the information needs of combatant commanders and leaves intact their discretion in the operational arts.

With roots in traditional military theory, the concept makes substantial advances in the broader context of Pentagon transformation and the demands of twenty-first-century warfare. Integral to effects-based planning and operations, ONA enhances awareness of the complexity of an adversary's internal dynamics and provides insights into likely responses to military and nonmilitary actions. It thus affords commanders a more fully integrated knowledge base for planning and facilitates more effective application of all the instruments of national power. Although plans called for original implementation of the concept in about 2015, experimentation has shown that many of ONA's ideas and constructs have near-term utility.

An examination of the term *operational net assessment* itself should prove helpful in introducing the concept. *Operational* refers to the concept's focus on the operational level of war, including military operations, planning, and intelligence functions. *Net* conveys ONA's comprehensive character, integrating a wide range of information relevant to a particular problem. *Assessment* alludes to the systematic collation, analysis, and review of pertinent information to develop a decision maker's knowledge base. Thus, it is a knowledge-centered *process* for leveraging information and expert analysis for the operational needs of commanders and decision makers, yielding a *product* that enables more effective planning.

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Roots and Development

ONA's development occurs in the broader context of the revolution in military affairs and Pentagon transformation. As noted by the director of the Office of Force Transformation, "Movement of societies from the industrial age to the information age is altering the efficacy of the methods and means that have defined our military capabilities for the better part of a century. Many well-developed concepts, tools, and capabilities of the industrial age are simply inadequate to the pace, rules and relationships of the age of information."[6] Exploring new joint war-fighting concepts and capabilities is JFCOM's tasking.[7] Responsibility for concept development, experimentation, and prototyping resides in the Joint Experimentation Directorate (J9), which develops capabilities and concepts that, through vigorous debate, collaboration, refinement, and prototyping, will increase the effectiveness of joint force commanders in the field.[8]

Intellectual Roots

As a tool facilitating information superiority, ONA has its conceptual roots in military theories, both ancient and modern. Sun Tzu emphasized the importance of knowing one's adversary, oneself, and the respective strengths and weaknesses of both. ONA's information-collation and synthesis capability places it clearly in the Chinese general's tradition. It expands the relevant areas of knowledge, however, integrating a wider range of nonmilitary information in its knowledge base. In this sense, ONA draws on Clausewitz's premise that war, as a policy instrument, is not limited to military actors. ONA facilitates the application of diplomatic, information, military, and economic national capabilities in pursuing the national interest.

Another Clausewitzian notion reflected in ONA and EBO is centers of gravity, defined in joint doctrine as those "characteristics, capabilities, or localities from which a military force derives its freedom of action, physical strength, or will to fight."[9] Col John Boyd argued that Clausewitz "failed to develop the idea of generating many noncooperative centers of gravity by striking at those vulnerable yet critical tendons, connections, and activities that permit a larger center of gravity to exist . . . paralyz[ing] the adversary by denying him the opportunity to operate in a directed fashion."[10] Col John A. Warden III also responded to the original center-of-gravity concept by conceiving the adversary as a system of interrelated systems, with strategic centers that influence other centers and systems: "The concept of centers of gravity is simple in concept but difficult in execution because of the likelihood that more than one center will exist at any time and that each center will have an effect of some kind on the others."[11] ONA and EBO explicitly analyze the linkages (tendons, connections, and activities) among multiple centers of gravity and among multiple systems.

Finally, Boyd also introduced the concept of the observe, orient, decide, act (OODA) loop for decision making and emphasized becoming oriented to an adversary and the dynamics of a competitive situation.[12] ONA and its use in effects-based planning provide a commander the historical, cultural, social, and political background necessary for "getting inside" the opponent's mind and decision cycle. Numerous experiments show that advance knowledge and organization speed up the orientation and planning needed for effective joint war fighting in the future.

Experimentation and War Gaming

In addition to the joint concept development, experimentation, and prototyping in JFCOM J9, the services maintain their own concept-development and experimentation processes. As noted by Maj Gen Michael Gould, USAF, "Let's face it. Joint warfighting is the key to winning our nation's wars. If we expect our combat forces to effectively plan campaigns and interoperate on the battlefield, it's imperative that we lay the right foundation by working together in joint concept development, experimentation, [and] by crafting joint functional and operational concepts."[13] One finds numerous examples of Air Force participation

in Department of Defense and joint experiments and war games.

Since its origination in the Rapid Decisive Operations war game of 2000, ONA's elements have undergone assessment and refinement in major and limited-objective experiments.[14] Millennium Challenge 02 (MC 02), a congressionally mandated, operational-level joint experiment, combined live forces with virtual and constructive ones. (The Air Force first experimented with its Global Strike concept in this experiment.) MC 02 had the overall purpose of assessing the ability of a joint task force to execute rapid, decisive operations, given a set of enabling and supporting concepts. In the experiment, ONA demonstrated the potential to contribute to EBO by providing a more thorough understanding of the adversary. Pinnacle Impact 03, to which the Air Force contributed its Decisive Coercive Operations concept, also generated several important findings related to future information operations and superiority.

In July 2004, the Air Force's Concept Development and Strategy Division and JFCOM cosponsored the Unified Engagement 04 (UE 04) war game, their first such partnership. Set in 2015, the war game emphasized assessing the Air Force's distinctive capabilities of air and space superiority, global attack, precision engagement, information superiority, rapid mobility, and agile combat support, along with other joint war-fighting concepts. The game included the US services, governmental agencies, and international coalition partners. Although application of EBO faced major challenges in the game, the subsequent UE 04 Senior Leadership Seminar noted the importance of ONA:

> At the strategic and operational level the Combined Forces Commander needs to have ready access to, or at least to fully understand, the range of national instruments of power available, in order to allow the broader selection of methods to achieve the desired effects. . . . Effects-Based Operations hinges on a uniformly understood, thorough, accurate and up-to-date operational assessment of the enemy. This net assessment should not be solely limited to military considerations but must cover all facets of the enemy which can be affected by our own elements of national power.[15]

Applications of Operational Net Assessment

In conjunction with intelligence-planning tools, ONA enables effects-based planning and operations.[16] EBO stresses a more comprehensive understanding of the enemy, in contrast to traditional approaches that emphasize force ratios and simple attrition. Given the strategic objectives of national security, EBO "focuses on combining and coordinating all elements of national power, military and non-military, to achieve its goals by influencing the will and perception of the adversary's decision-makers."[17] Developing a clearer, more comprehensive situational awareness is a key function of ONA.

In service of EBO, ONA enhances a commander's understanding of the internal complexity of an adversary and provides planning tools for developing actionable recommendations on applying relevant capabilities to achieve desired outcomes. Some early efforts at effects-based war fighting may not have lived up to expectations, but experience and experimentation have yielded improvements in EBO and its related concepts.[18] Early conceptual critiques also served to strengthen and revise the EBO concept and its application, winning over some critics.[19]

One of the environments to which ONA contributes is the Standing Joint Force Headquarters Core Element (SJFHQ[CE]), a joint command-and-control element being established at each combatant command.[20] The SJFHQ(CE) assists a combatant commander, joint force commander, and their staffs in gaining thorough regional situational understanding when operations require an integrated joint response. The element's battlespace awareness is facilitated in concert among ONA; joint-intelligence preparation of the battlespace; predictive battlespace awareness; and crisis-oriented, national-intelligence support teams. As an operational-planning tool, ONA complements these other intelligence

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initiatives by filling in knowledge gaps on nonmilitary systems and nodes, thus providing deeper situational understanding in advance of joint-force deployments. Area experts in the SJFHQ(CE) Information Superiority Group apply ONA to effects-based planning and component training in the continuum between normal and crisis conditions.[21]

Once a situation emerges that requires response from the joint task force, conditions can change rapidly, and the ONA analysis and update process becomes much more dynamic. Although ONA is most fully developed in terms of precrisis, baseline planning, its functioning during operations and assessment is still formative. By design, ONA's supporting role for EBO requires input to and feedback from effects-based assessment.[22] Both ONA and effects-based assessment will influence intelligence requirements during operations to update the ONA process and knowledge base (discussed below). One then uses the updated knowledge base to adjust planning and operations: "Ideally [the continuous, collaborative ONA process] continues through all phases of a campaign. During crisis response, . . . analysts must update and maintain their analysis at a rate at least equal to the adversary's ability to adapt."[23] Whether ONA will meet those expectations in real crises is an empirical question that remains under examination.

Similar collaborative-planning networks and joint war-fighting structures have been emphasized in recent efforts to reengineer the Air Force's command structure in support of an expeditionary Air Force. Air and space expeditionary task forces currently support joint force commanders on a temporary basis in order to perform specific missions requiring a customized set of air, space, and information capabilities.[24] Proactive integration with SJFHQ(CE) is linked with evolution toward a fully joint air and space headquarters.[25] Having provided background on ONA's theoretical and intellectual origins and having described its operational context as a planning tool in the SJFHQ(CE) in support of EBO, let us turn to the process and product that is operational net assessment.

The Operational Net Assessment Process, Knowledge Base, and Planning Tools

The ONA *process* is a framework for collecting and analyzing information related to the commander's battlespace. It synthesizes a superior knowledge base (compared to earlier information databases) into a coherent understanding about friendly and unfriendly forces, strategic objectives, and capabilities. ONA analysts continually generate and analyze information from many sources. They compile a knowledge base on specific regions as well as national and international actors, accessible through a Web-based knowledge portal.

Data collation and knowledge development are perpetual and collaborative, involving governmental, nongovernmental, and multinational partners. Governmental participants include agencies such as the Departments of State and Treasury and the military services. Nongovernmental actors include subject-matter experts, centers of excellence, industry partners, and other sources in the public domain. Multinational partners include allies' military and intelligence services, and the Multinational Interoperability Council.

System-of-Systems Analysis

The central framework for studying an adversary is known as system-of-systems analysis.[26] A central task in linking political objectives and military strategy entails "analyz[ing] completely our potential opponent's ideology and his political, economic, military, and cultural systems."[27] Extending beyond comprehension of military systems and capabilities, adversaries are understood as multidimensional and comprised of internal political systems, economic systems, transportation and infrastructure systems, formal and informal social structures, and information networks.

This approach to adversary analysis also acknowledges that some foreign systems have external facets (such as the presence of American or multinational corporations). Actions taken against any one of these systems will

likely have effects that spill over into the other systems. ONA ascertains the cause-and-effect relationships within and between those systems and identifies leverage points that one might act upon in order to influence the adversary.

The events of 11 September 2001 illustrate the United States' system of systems. Following the attacks, America's air-transportation system shut down for days, and the airline industry has only recently shown signs of recovery. The national government consolidated homeland-security institutions, and significant internal-security latitude has accrued to the Department of Justice. The nation went to war, which became an important issue in the 2004 elections. Even Americans' Internet usage changed.[28] In short, 9/11 had wide-ranging effects on the US economy, politics, infrastructure management, and information systems. The well-coordinated attack had a profound impact throughout our system of systems.

Operational Net Assessment's Knowledge Base

The ONA process yields a baseline ONA product—its *knowledge base*. Accessed by commanders and planners through a dedicated, Web-based knowledge portal, it augments an existing knowledgeable and well-networked staff. This combination of the knowledge base and staff provides the decision maker with summaries and a comprehensive analysis of the adversary's military and nonmilitary characteristics and capacities. The ONA knowledge base is regularly updated, based on emerging strategic and operational objectives, with information and feedback provided by effects-based assessment.

The knowledge base organizes information into one or more categories—political, military, economic, social, information, and infrastructure (PMESII, pronounced *pŭ-mee′-see*).[29] Multiple classifications are possible; an airport, for instance, might be economic, military, or both. Items in the knowledge base are thoroughly linked, based on input from subject-matter experts and other sources. Each datum includes information about its significance, both in the context of its PMESII system type and in the system of systems.

In service of EBO, analysts classify each datum as a node, action, or effect. A *node* is a person, place, or thing against which one takes action in order to produce an effect. An *action* is a diplomatic, informational, military, or economic activity that one may take against a node. An *effect* is the physical state or behavior that results from one or more actions. A *primary direct* effect of an action achieves a commander's chief intent. *Secondary direct* effects from that action also occur but are not the commander's main objective, while *second-order indirect* effects are cascading consequences of an action. Finally, suggested *resources* for producing effects are linked to nodes and actions but are pitched at a very general level, leaving to commanders the operational arts. During the Gulf War of 1991, the planning for attacks on the Iraqi air-defense sector operations centers used an early EBO concept:

> Initially, air planners determined that destruction of the facilities [an action] would require eight F-117s to deliver four 2,000-pound bombs [resources] against each of the hardened underground facilities [nodes]. However, planners argued that to achieve the effect desired, the facilities had only to be rendered inoperative [the desired effect]. Therefore, complete destruction was not necessary; forcing the operators to abandon the facility and cease operations would achieve the desired effect. In this case, effects-based thinking and operations produced the most efficient and effective way to employ force, achieve the commander's intent and increase flexibility and responsiveness by freeing up scarce assets for use elsewhere.[30]

Planning Tools

The ONA knowledge base includes a variety of tools that support a commander's planning process. An effect/node/action/resource (E/N/A/R) sequence begins with identifying the desired effect; relevant nodes, prospective actions, and applicable resources are linked sequentially. Importantly, the planning tool identifies multiple—including unexpected—predictable linkages. This allows decision makers to see in advance an action's expected and *unintended* first- and second-order effects

and to become aware of potential undesired or counterproductive effects.

ONA planning tools export to Microsoft Word or Excel, making it easy to integrate output into message traffic and planning documents. A sample plan exported to Word from the ONA unclassified knowledge base for Indonesia implements strategic and planning guidances to maintain freedom of navigation (FON) in the Singapore Strait by enlisting government support (see table).[31] The "Effect Priorities" section shows the primary effect articulated in terms of the behavior we desire: *O/P [Orange and Purple] leadership does not inhibit FON* or *Orange and Purple leadership takes no actions that restrict FON.* (Orange and Purple are experimentation references to countries under analysis, here Indonesia and Malaysia; the effect is numbered E0001P.)

The "Effect/Node/Action (E/N/A)" sequence links the desired effect with two nodes and actions. The node *Commander in chief, Indonesian armed forces* is linked to the action *Influence O/P military* (through "direct use of media and intelligence assets to provide direct influence"). The node *President of Indonesia* is linked to the action *Congressional/parliamentary engagement.* The "Resources" section links the sequence to *Foreign offices*, *Defense ministries*, and *Other governmental departments/ministries.* Resources associated with a different effect (*O/P military does not block straits*) and action (*Position military force in-theater*) are also listed.

Several graphic layouts for E/N/A linkages are being developed at JFCOM J9—for example, the desired effect (*O/P leadership does not inhibit FON*) and links to nodes, other effects, and selected actions (effects, nodes, and actions vary a bit from those in the table, due to selection of display options and editing) (see fig.). Several nodes are linked to the effect, including domestic politicians, foreign leaders, and international organizations. A selection of possible actions is linked to two of the nodes; small icons on the boxes refer to expandable E/N/A links for optional display.

Both examples clarify that ONA tools are not limited to military actions that one can take in pursuit of desired effects. In fact, most of the nodes and actions are nonmilitary, expanding a commander's awareness of planning options and resources. Moreover, one notes four other effects closely linked to the desired effect, broadening operational and tactical perspectives (see fig.). Decision makers share the ONA knowledge base, yielding a common holistic understanding of the battlespace. By enabling faster planning and better decisions, it becomes central to long-term efforts toward information superiority for joint force commanders.

Future Capabilities

Whether ONA reaches its full potential hinges on some capabilities that may not exist before 2015. Early ONA experimentation led to recommending the development of a knowledge-advantage capability to increase access to the full body of knowledge available to the US government and multinational partners. Other future ONA-related concepts include networks of centers of excellence, subject-matter experts, and communities of interest for collaborating on detailed cause-and-effect analysis of adversary systems. Finally, the instantiation of ONA in commands will permit assessment of its performance in crises.

Hardware and software capabilities, now at an immature stage of development, have yet to fully enable ONA's capacity to synthesize an extraordinary amount of information. Still under development are new analytic and collaborative tools, interoperable databases, and automated security tools to facilitate and protect information sharing and processing. Applications that capture intangible PMESII information (such as social, political, and religious data) are not yet fully formed. The ability to model and simulate adversary responses is currently limited, as is our capacity to forecast behavior accurately. Finally, effective implementation of ONA requires leadership, education, and training, including methodologies for effects-based planning and operations.

Table. Example of an ONA report, exported to Microsoft Word

PLAN:	Maintain Freedom of Navigation (FON)
Strategic guidance:	Maintain FON.
Commander's intent:	Ensure that all commercial shipping traffic is allowed to pass freely.
Planning guidance:	Enlist government support to assist in maintaining FON.
Measures of effectiveness:	No commercial vessel is interdicted.

Effect Priorities:				
Phase	Task Planning	Effect Priority	Effect	Description
Influence	Joint psychological operations task force	0	E0001P: Orange and Purple (O/P) leadership does not inhibit FON.	O/P leadership takes no actions that restrict FON.
Coerce	Joint force land component commander Joint force maritime component commander	0	E002M: O/P increases military cooperation.	O/P increases military cooperation with coalition members. CJCS 151042Z FEB 03 states that every effort will be made by military planners to emphasize nonmilitary resources/ solutions. Do not foresee use of military action other than theater engagement.
Compel	Joint Interagency Coordination Group	0	E005P: Benefit of FON	O/P leadership persuaded of the economic and political benefits of ensuring FON.

Effect/Node/Action (E/N/A):			
Sequence	Effect	Node	Action
null	E002M: O/P increases military cooperation.	NID2100: Commander in chief, Indonesian armed forces	A090: Engage in combined military exercises with O/P.
1	E0001P: O/P leadership does not inhibit FON.	NID2100: Commander in chief, Indonesian armed forces	A031: Influence O/P military.
2	E0001P: O/P leadership does not inhibit FON.	NID1001: President of Indonesia	A006: Congressional/ parliamentary engagement
3	E0002M: O/P military does not block straits.	NAF1003: Taliban leader	A004: High-level political-military engagement

Resources:			
Resource	Effect	Node	Action
R029: Foreign offices	E0001P: O/P leadership does not inhibit FON.	NID1001: President of Indonesia	A006: Congressional/ parliamentary engagement
R030: Defense ministries			
R031: Other governmental departments/ministries			
R006.1: Maritime air	E0002M: O/P military does not block straits.	NID2106: Future TNI-AL (Indonesian armed forces) (navy) chief	A052: Position military force in-theater
R010.2: Subsurface forces			
R013.1: Strategic bombers—strike			
R014.2: Tactical bombers			
R023.2: Special forces			
R040.1: Port facilities			
R041.1: Air bases			
R071: Ability to win hearts and minds—great diplomats			
R072: Clearance divers			

Source: Created by the ONA database, JFCOM J9 ONA Team intranet,19 August 2004 (edited for clarity).

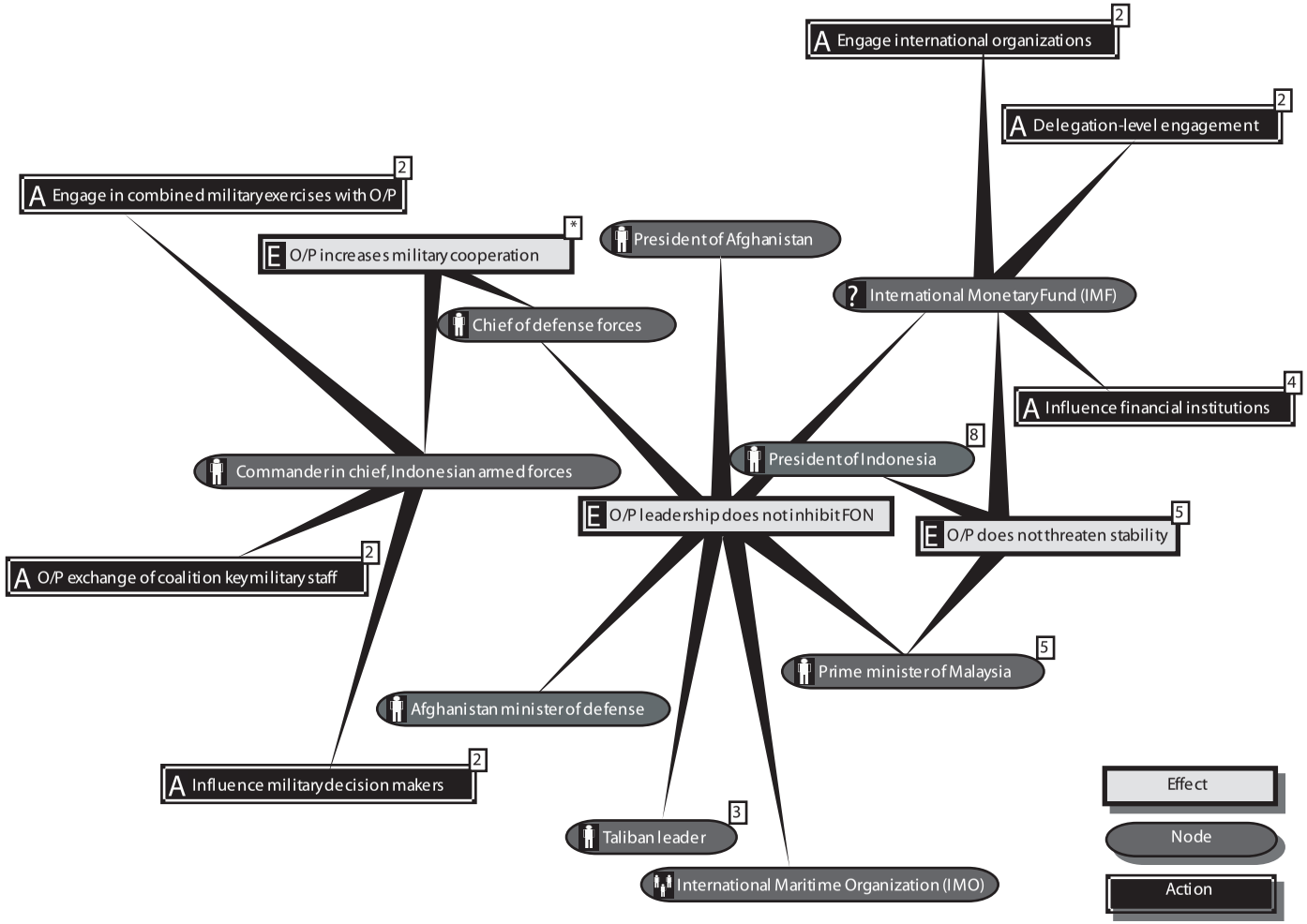

Figure. ONA knowledge base graphic-layout visualization tool. (From JFCOM J9 ONA Team intranet database, 19 August 2004.)

Toward Information Superiority for Joint War Fighters

Future joint forces will rely on our capacities to "gather, integrate, and apply more data, information, and knowledge than analysts and policy makers in earlier eras."[32] Still, the need for reliable information dates from ancient times, as one can confirm in the writings of Sun Tzu, Caesar, and others. Effective use of information results when one derives actionable knowledge from a detailed understanding of an adversary's systems, capabilities, and intentions and delivers it in time to make planning and operational decisions for engaging the adversary.[33] ONA facilitates information superiority more effectively than legacy planning in several ways.

First, one must consider ONA in relation to the EBO and SJFHQ(CE) concepts. All three seem poised to make significant contributions at the operational and tactical levels of joint operations planning. As a concept supporting information superiority, ONA permits joint force commanders to "hit the ground running" upon formation of a joint task force. This can occur because ONA's persistent development begins long before one requires its content. When a crisis emerges, the planning process is streamlined because the command's learning curve is essentially eliminated. This simplification permits the command to avert other downstream complications associated with ad hoc establishment of a joint task force.

Second, the ONA knowledge base, grounded in the system-of-systems analytical construct, reflects the reality that adversaries are not monolithic but complex and adaptive. ONA's collaborative acquisition and analysis of PMESII information provide a more fully integrated and holistic picture of the actors with whom a commander must engage. This reduces uncertainty (but does not eliminate it) in the commander's battlespace.

Moreover, because ONA facilitates application of the diplomatic, informational, economic, *and* military instruments of national power, it can support a variety of operations other than war. These may include law enforcement, humanitarian assistance, homeland security and defense, civil affairs, and infrastructure protection and restoration. Indeed, recent operations in Iraq and Afghanistan show that many distinctions between planning for war and planning for operations other than war have dissolved.[34]

Third, the ONA knowledge base and planning tools do more than simply provide additional information to planners. Preanalyzed links among effects, nodes, actions, and resources provide a commander's staff with rapidly actionable knowledge. The commander's resulting information superiority enables effects-based planning and operations. Reports generated by the ONA knowledge base clarify the expected and unanticipated effects of actions taken against key nodes in the battlespace. Ensuring that decision makers have a broad awareness of the range of resources and predictable effects of actions will improve situational awareness and understanding, increasing the likelihood of achieving desired effects in pursuit of strategic objectives.

One can also make the case that ONA's contribution to EBO permits joint war fighting to meet the standards of a "just war," to a degree that far exceeds any military's capacity in history. More effective and efficient planning improves our capacity for meeting the *jus in bello* standard of proportionality, so that we do not apply tactics excessive in proportion to war-fighting objectives: "Underlying and shaping these military accomplishments [of the Iraq War] is the Western moral tradition. Perhaps more than any other single factor, the Christian 'just war' tradition has defined the scope and style of Coalition engagement. At the heart of that tradition is the obligation to use all reasonable means to protect innocent lives from the ravages of war."[35]

A related concept—effects-based targeting—is useful for discriminating targets of military necessity from targets with a high risk of unnecessary collateral damage, meeting the just-war principle of discrimination. For example, analysis of Operation Allied Force (Serbia, 1999) "suggests that joint planners should never have sent many of the targets forward because of a lack of military significance to

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the stated objectives and the likelihood of disproportionate collateral damage."[36] By contrast, in the Iraq war of 2003, "new intelligence assets and targeted planning . . . allowed the United States and Britain to seek to paralyze and destroy a regime, not bomb a country."[37]

Finally, at the tactical level, the commander's improved battlespace awareness will also profit joint war fighters, as amply demonstrated by EBO execution in Iraq. On 18–19 March 2003, coalition aircraft so effectively targeted Iraqi air traffic control and antiaircraft assets that they obtained near-total air dominance before ground forces arrived in country on 20 March.[38] Joint war fighters clearly benefited from an improved capacity for applying information about enemy forces and the location of weapons systems. Moreover, combining such awareness with other technical advances associated with networkcentric warfare should significantly reduce incidents of fratricide.[39]

Experience and war games, including the recent UE 04, have led to the conclusion that achieving *decision* superiority hinges on the ability to achieve *information* superiority, which in turn leads to improved situational awareness and decisive strategic advantage. It is the joint vision for information superiority that stimulated the development of ONA. By providing joint force commanders with extensive information in advance of a crisis, as well as actionable knowledge with planning tools for such a situation, ONA facilitates decision superiority in the heat of the crisis. In the same way that Caesar found it judicious to acquire sufficient information about his opponent in advance of war, we are actively pursuing the modern imperatives of information and decision superiority by fielding the emergent capabilities of operational net assessment. ❑

Notes

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23. "Concept Paper," 23.

24. AFDD 1, *Air Force Basic Doctrine*, 63.

25. *Transformation Flight Plan*, 39–40.

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38. Ibid., 60–61. Of course, it helped that the paranoid regime ordered its entire fleet of MiG-23s, MiG-25s, and Mirage fighters disassembled and buried in the sand. For example, see David Zucchino, *Thunder Run: The Armored Strike to Capture Baghdad* (New York: Atlantic Monthly Press, 2004), 138.

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I'm very proud of how our team of air and space professionals came together for this conflict and how well they worked with our Navy, Marine, Army, and coalition partners.

—Gen T. Michael Moseley, USAF

Public Affairs and Information Operations

A Strategy for Success

MAJ TADD SHOLTIS, USAF

Editorial Abstract: Major Sholtis notes that commanders are looking for better ways to use the global information environment to win the hearts and minds of Muslim populations and retain the goodwill of traditional allies. Their efforts occur against a backdrop of individuals who advocate the integration of public affairs (PA) and information operations (IO) and those who argue for their separation. The author observes that as the public face of our joint forces, PA cannot thrive unless it is integrated with all core operational capabilities, including IO.

FROM THE DEPARTMENT of Defense's attempts (ultimately withdrawn) to set up an Office of Strategic Influence several years ago to more recent decisions establishing similarly conceived strategic-communications staffs as part of Operation Iraqi Freedom, much discussion has dealt with the proper employment of the US military's various capabilities for providing information to public audiences. Specifically, the debate has addressed the proper distinction between public affairs (PA) and the more diverse col-

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lection of information activities grouped under the doctrinal umbrella of information operations (IO). The *New York Times* warns of "blurring the traditional lines" between PA and IO, "leaving the American public and a world audience skeptical of anything the Defense Department and military say—a repeat of the credibility gap that roiled America during the Vietnam War."[1] The chairman of the Joint Chiefs of Staff has issued a warning about the risks of PA-IO integration, and the Public Relations Society of America (PRSA) has gone on record to advocate a "firewall separation between IO and PA."[2] As Air Force planners approach this debate to define the role of PA and IO at the operational level of war, we need to understand the public context of the debate and some of the major factors shaping service views of both disciplines. Beyond defining how PA and IO are either understood or misunderstood today, the Air Force must seize the opportunity to address some fundamental questions about the operational role of public communication through a comprehensive review of its information programs.

The Current Debate: Myths about Public Affairs and Information Operations

The recurring question in the current public debate over PA and IO asks whether PA's involvement in a broader strategic-information campaign inherently damages the military's credibility with media representatives and, by extension, the audiences served by those media. Expressed from a reporter's perspective, "If I know that public communication is part of a military strategy, when do we reach the point where the military's honesty becomes the victim of its objectives?" At the risk of seeming too dismissive, a perfectly reasonable response to this question is "What else is new?" Although a large and politically divisive military operation like the one in Iraq certainly raises the stakes on all sides, some version of the PA-IO debate has been with us at least since the fourth century BC, when Sun Tzu's *Art of War* broadly characterized successful military strategy as a matter of deception. From ancient China to the front page of today's newspaper, many people still regard truth as the first casualty of war.

The battle over truth remains a constant in today's global-information environment, not only between the media and the military but also among various media outlets and rival private or public entities. In the present media marketplace, a certain degree of advocacy for an organization's vision of the truth is commonplace. In fact, most media representatives, while stressing the importance of seeking out independent or opposing viewpoints, admit that they are often unable to do their jobs without the support of public-relations "flaks."[3] Why, then, have efforts to develop military PA and IO capabilities suited to this environment met with so much resistance? For many military outsiders and some insiders, the tendency to reject proposals for a closer PA-IO relationship is often grounded in four myths important to understanding the way ahead for both disciplines.

Myth One: Information Operations Involve Lying

Many people who have spoken in favor of a PA-IO firewall do so because they are convinced that the two functions serve entirely different moral ends. PA officers must tell the truth. Information operators, many believe, are paid to lie. In reality the small, highly compartmentalized specialty of military deception is the only branch of IO that knowingly provides false information—often accomplished merely by allowing the enemy to reach his own wrong conclusions about observed facts. Psychological operations (PSYOP), the larger segment of IO's influence capabilities, provide factual information—including rebroadcasts of straight news stories—although PSYOP methods often rely on emotional appeals more similar to advertising than journalism.

Myth Two: Credibility Is an Absolute

An extreme but no less prevalent permutation of the "IO involves lying" myth is the argument-clinching assertion that, regardless of the true

nature of IO, even the *perception* of an association between IO and PA is enough to destroy credibility. Immediately. Forever. With everyone. This is nonsense—for two reasons. First, credibility varies from situation to situation, outlet to outlet, spokesman to spokesman, and audience to audience. The credibility of an infantryman talking to Fox News differs from the credibility of a senior Pentagon official talking to al-Jazeera, even if they're talking on the same day about similar topics. Second, saying that public communication cannot succeed without credibility puts us up against the hard facts that our enemies have had good media success without being particularly truthful, and that modern media are often more concerned with framing ideological conflict than with judging which version of the truth is right.

Certainly, the need to maintain credibility is an institutional value; as such, it presents a perceptual challenge that the military must overcome with key publics as it defines the PA-IO nexus. But the existence of that obstacle is not in itself a reason we should consider the two functions utterly incompatible.[4]

Myth Three: Advocacy Is Politics

Another argument that has emerged most clearly during Iraqi Freedom maintains that a strategic approach to PA—one that aligns public communication with military objectives—is inherently political, whereas PA activities on behalf of the military as a public institution should remain apolitical. This stance derives almost entirely from media skepticism about the Iraq war and the resulting assumption that any attempt to highlight good news from that theater must be part of the ideological thrust-and-parry between the Bush administration and its foes in the mainstream media. In reality, though, the military assists in the reporting of a good deal of bad news from Iraq, so anyone accusing PA of bowing to political pressure needs to carefully consider the difference between seeking balance and taking sides. Right or wrong, America's elected leaders made the political decision to commit military forces to the overthrow of Saddam Hussein and the stabilization of Iraq. Following that decision, honest attempts by military communicators to convince various audiences that those forces were making a difference are often better interpreted as part of a strategy for mission success—not as partisan jingoism.

Myth Four: People and Media Are Sheep

A final argument—one that, oddly enough, finds its way directly or by inference into many media articles on the topic—holds that the military should curtail its efforts to "push" information to media outlets because the public, or the outlets that serve them, are either too lazy or stupid to make distinctions between a PA product informed by one source and a genuine news product informed by multiple sources.[5] Like the argument that perceives advocacy as politics, this position is better understood as a larger problem of the information environment than a specific failure or corruption of military-communication efforts within that environment. If a television news program will run a military news-release video—or, for that matter, an insurgent group's digital video of a beheading—without placing that information in the context of its source, that certainly constitutes a problem. Ultimately, though, such a problem must be negotiated between that news program and an audience with access to many other information sources.

A casualty count is a fact. A criminal charge against a US soldier accused of abusing an enemy prisoner is a fact. The military continues to meet its civic obligations to release information on this kind of "bad" news, which has no problem getting the immediate, worldwide attention it deserves. But the construction of a school for needy children in a war zone is also a fact. Can one seriously accuse the military of shirking civic responsibility if it puts some effort into getting more positive facts into the margins of media consciousness?

The American military must maintain public trust, and leaders must take action whenever communication efforts push or exceed the bounds of credibility. To attribute the military's recent stumbles in public com-

munication to some kind of evil influence from IO, however, is both to misunderstand what PA and IO are and, more importantly, to miss the true opportunities for reform opened by this debate.

The Current Doctrine: Diverging Concerns

The challenge for Air Force leaders, then, lies in defining and organizing PA and IO forces in a way that corrects these persistent misunderstandings and provides the most effective information capabilities for the service. Unfortunately, this task is complicated rather than simplified by the differences between service and joint doctrine. Since late 1999, Air Force doctrine has envisioned a fairly cozy supporting relationship between PA and IO. The most recent revision of the doctrine, for example, describes PA as "an important and necessary military capability of influence operations"—the branch of IO that includes PSYOP and military deception.[6] In contrast to the Air Force's approach, newly revised Joint Publication 3-61, *Public Affairs*, takes greater pains to distance PA from IO.[7] While the language of doctrine is broad enough only to suggest the split, differences between the Air Force and the joint community in IO capabilities, cultures, and methods for collecting information at the operational level of war suggest deeper reasons for divergent service concerns about the PA-IO relationship.

Capabilities

A joint force commander (JFC) has a fairly extensive menu of IO capabilities or enabling forces to choose from in a major operation, including a joint PSYOP task force and the support of civil-affairs units trained for direct engagement with foreign communities. However, many of these disciplines—either as a result of legal restrictions or the degree of specialization involved—operate fairly independently. Therefore, the JFC needs to have an IO plan that coordinates and deconflicts these efforts toward common operational objectives while capturing their diverse contributions to the fight in a way easily understood by operators.

In contrast, the Air Force's current IO capabilities are much more limited but highly integrated. When an Air Force officer serving as the joint force air component commander (JFACC) expresses the need for an IO plan, he or she is probably not discussing things accepted as givens—such as the use of F-16CJs or EA-6Bs to destroy or jam components of an enemy air-defense network, even though one finds these capabilities grouped under the IO umbrella in Air Force doctrine. Electronic attack, defense, and deception capabilities—as well as the ability to support the JFC's influence operations with airborne platforms such as the EC-130E/J Commando Solo—are already integrated into component planning in an advanced way. Although perhaps not doctrinally sound, the purely informational influence options typically presented to a JFACC—those that do not depend upon blowing things up or generating aircraft sorties—lean heavily toward PA efforts, such as countering enemy propaganda. In terms of what the commander's forces can actually do to deliver information to a target audience, then, it is harder for the JFACC to distinguish between PA and IO.

Cultures

All military organizations are hierarchical, but some are more hierarchical than others. In the joint world, the emphasis in IO falls on operations, and the head of the JFC's IO effort takes direction from the J-3. From this vantage point, some people see PA-IO integration as a path to PA's becoming one of many functions under the J-3. If this happens, they believe that PA is subjected to highly structured operational ways of doing business that impair PA's effectiveness, corrupt its purpose, and challenge its status as a direct adviser to the commander.[8]

Loss of PA's identity as a function distinct from operations is no small concern, especially when the immediate global effects and personal accountability associated with public communication during a conflict demand rapid re-

sponsiveness from the highest levels of command. This tension, although still present, is less noticeable in the looser organization of a JFACC's air and space operations center (AOC), where divisions and specialty teams made up of Airmen from different functional cultures work in a more collaborative way.

Collection

Ironically, the same broad cultural concern driving some members of the joint community to resist PA-IO integration—keeping PA in front of the commander as a public responsibility and key consideration in long-term mission success—also motivates certain people in the Air Force to seek greater PA-IO integration in the air component's main weapon system: the AOC, which depends upon skilled crew members trained in its processes, language, and communication systems. As the command and control (C2) node for the air component, it is the place where tactical events come together to provide a theaterwide picture—exactly the kind of picture PA needs to paint for media trying to put their near-instantaneous observations of tactical events in context. The AOC also offers centralized access to aircraft weapon-system video; intelligence, surveillance, and reconnaissance imagery collected by theater assets; and other visual information essential to effectively countering enemy propaganda, as well as the ability to task some of these collection assets in support of specific information efforts.

To have effective access to the information-collection capabilities and decision-making processes contained in the AOC—access limited by real or perceived caps on manpower, training slots, and security clearances—some Air Force PA planners have felt the need to make a case for operationalizing PA or weaponizing information. Doing so equates to defining a close functional relationship between IO, which has an established seat in the AOC as a specialty team, and PA, still widely perceived as a mission-support function living outside the AOC (perhaps even geographically separated from it), on a logistics-focused Air Force forces (AFFOR) staff.[9]

The joint community does not share these specific motivations for establishing a PA-IO link since the prerequisites for plugging into C2 information are not as rigid in other services or on joint staffs. However, the trend toward collaboratively meshing PA and IO on strategic-communication staffs in Iraq indicates that the time may be ripe for a serious effort by the Air Force to define how we should organize, train, and equip public-information forces for future joint operations.

Time for a Review

Such a comprehensive effort to build organizing concepts for PA and IO deserves more attention that it gets from the few disconnected officers currently submitting and rejecting document edits as the Air Force makes its normal rounds of updating doctrine; instructions; plans; and tactics, techniques, and procedures. Information superiority remains the Air Force's single greatest weakness. No enemy on the planet can match or physically overcome our ability to deliver decisive kinetic effects; however, enemy forces can—and do—limit the scope or impact of those operations through information that questions our effectiveness, degrades our morale, and builds public support against our operations. We can win any battle, but the war is up for grabs when it requires sustained commitment from international populations or even a plurality of Americans.

Given the tremendous information challenge facing the Air Force in this century, PA and IO could certainly benefit from a comprehensive, leadership-directed, cross-functional, expert review—something similar to an Eagle Look. Such a review would closely examine what PA and IO *can* be, based on current law and other existing restraints; what those capabilities *should* be, based on the opportunities and challenges of the information environment; and what the Air Force as a whole must do to get from where it is to where it needs to be. Although such a strategic review would necessarily involve inputs from many quarters, the following five suggestions serve

as starting points for developing a strategy for success in PA and IO.

Do Not Define PA and IO Solely in Terms of Audience

Whatever its faults, the concept of strategic communication embraces the difficulty of separating the effects of PA and IO in the information environment. This difficulty even applies to military deception, which, almost by definition, consists of openly observable facts that PA must at least be aware of if not prepared to discuss. The somewhat naïve solution currently offered by joint doctrine and the PRSA Board of Ethics and Professional Standards, among others, seems to call for theorizing separate information spheres: one in which PA engages global news media and builds support among US, coalition, or neutral populations, and one in which IO employs its capabilities to influence the enemy. Can such a distinction really exist when the enemy, even if easily segregated from larger populations, gets his information from the same satellite news channels or Internet sites potentially used by millions?

Any attempt to simplify the PA and IO "job jars" strictly by intended audiences will lead to a situation whereby PA "owns" communication to friendly audiences through international media, while IO owns communication to presumably hostile audiences through smaller local information sources. Such an approach would result in the production of uncoordinated information products that inevitably affect all audiences in unpredictable and indiscriminate ways.

Accept the Fact That PA and IO Can and Should Cooperate in Influence Operations

Globalization's smoothing of the seams between formerly segmented audiences makes it imperative that PA and IO integrate strategies and tactics to present consistent messages. Because of audience and message overlaps, a defined PA-IO relationship at least must allow for the equivalent of "blue-force tracking"—knowing what information is being released through what sources to what audiences at any point in time—to avoid information fratricide. Beyond deconflicting information release, though, a second fundamental reason requires that influence operations become a cooperative effort between PA and IO: the question of efficiency. The military has too few resources or trained communicators of any stripe—PA or IO—to deal adequately with the overwhelming information demands of major conflicts, much less protracted counterinsurgency campaigns, nation-building efforts, or steady-state security-cooperation initiatives. Fully capable PA and IO forces inevitably would see overlaps in areas such as skills training, planning products, or assessment tools. Success in a world largely unconcerned with the fine distinctions of US law, military doctrine, or professional standards will require that we do what we legally and ethically can to make the most of what we have.

Understand That Both PA and IO Have Real and Necessary Limits

An important part of achieving these efficiencies will come when people see PA and IO as distinct tactical approaches to shared information objectives. As such, they can benefit from better integration at the strategic-planning level, but even more from defined constraints on the kinds of tactical actions in which each specialty should be involved. The tactics used by each specialty—as well as the technical know-how needed to implement those tactics—can be significantly different, although both clearly attempt to influence human perceptions of similar circumstances (see table). The difference becomes starker when we consider the potential effects of these tactics. The IO messages are unambiguous, while the PA messages allow media and audiences to draw their own, possibly contrary, conclusions. The reach of the IO product is limited to people who actively pick up the leaflet or tune in to specific broadcast frequencies; the PA message can, but sometimes does not, permeate many different media available to an audience.

To put the issue in kinetic terms, IO messages in many cases resemble precision-guided bunker-buster munitions: the small number of military people in the bunker intended as

Table. Sample information tactics employed in support of military objectives

Objective	*IO Influence Tactic*	*PA Tactic*
Deter the enemy from engaging in military action.	Broadcast radio messages on the futility of military operations against a superior force.	Demonstrate military resolve by promoting media coverage of the deployment of combat-capable forces to the region.
Degrade the enemy's Integrated Air Defense System.	Drop leaflets in the vicinity of surface-to-air missile positions showing missile launchers being destroyed by aircraft.	Conduct media interviews on the capabilities of friendly aircraft in the suppression-of-enemy-air-defenses mission.
Isolate enemy leadership from its fielded forces.	Disseminate messages over enemy communication channels showing that enemy leaders do not deserve the loyalty of their troops.	Provide media with messages, facts, and visual products demonstrating international participation in or support of friendly military action against enemy leadership.

targets of that weapon are immediately affected in a definite way, but, for the most part, everyone else remains oblivious of the effect. PA, however, resembles a GBU-43 Massive Ordnance Air Blast bomb: many more people—hostile, neutral, and friendly—see or feel the effect, but not everyone is affected in the same way. Both munitions have value, but both also have appropriate constraints and restraints on their practical use.

In terms of tactical limitations, for example, PA can do very little to subdue a violent insurgency that has taken firm hold of a specific geographic area (e.g., a city). Even when residents of that city have access to independent media, they have no ability to influence events. In such a case, IO can wear down insurgent morale or support friendly kinetic operations while PA focuses on building a public case for decisive military action. On the other hand, in an effort to convince people in an area the size of a country not to join an insurgency, IO is not the way to go. Regardless of military leaders' appreciation of the input-equals-output logic of IO products, independent or hostile media will contest even the most widespread and persistent application of an IO message. Broad popular conviction must be won on the more expansive but marshy terrain of PA and public diplomacy.

Educate Commanders about Information Effects

Part of the reason PA and IO lack the kind of strategic focus needed to apply appropriate ends to means is that commanders do not have a complete understanding or appreciation of the capabilities, limits, and risks associated with information activities. This is particularly true in the emerging era of effects-based operations, when some commanders seem to have adopted an almost axiomatic belief that the effects of information activities are beyond concern because they are beyond control—that is, one cannot meaningfully assess PA and influence operations.

The fact is that communication *can* be measured. Sometimes the measurement of an information effect is binary. That is, an individual or group, asked to do something at a particular point in time, either will do it or not. Someone wishing to provide specific information to a specific audience through a specific medium either places the information in the medium or not. One can also examine qualitative or quantitative trends over time by looking at groups of message receivers (through surveys and focus groups, two of the most widespread assessment activities on the planet, even during war) or groups of messages themselves (through media-content analysis).

Planned and executed correctly, these methodologies can provide data to drive timely, useful decision making. For example, Air Force PA planners may determine that "good" media coverage of an operation includes information about our effectiveness at striking various types of enemy targets, which both undermines enemy morale and contributes to the broader public perception that military forces are making progress toward an achievable end state. If content analysis demonstrates that successful insurgent attacks on US forces crowd out coverage of other operational successes, the JFACC may choose to put more effort into getting out information about airpower's ability to attack time-sensitive targets like insurgent cells or about our success in doing so.[10] One can also apply content analysis to the military's own PA and IO products, ensuring that diverse communication activities contain the strategic themes or messages commanders consider most important during given periods of time.

We need to better educate senior officers in the application of PA and IO—especially flag officers likely to serve as operational spokespeople. Unless the Air Force makes room to develop more senior PA officers with more extensive operational experience, such spokespeople may be a necessity: they benefit from the authority conferred by rank and from deeper familiarity with the planning and execution of operations. Although thorough coordination of PA and IO remains essential for strategic planning, a head spokesperson is by definition a PA officer who should operate using the full range of PA capabilities while also observing PA's tactical restrictions. Put another way, if a JFC or JFACC appoints a senior officer as head spokesperson and makes him or her responsible for actually *running* a public-information effort—rather than merely conducting a limited number of interviews and press conferences, working from provided plans and guidance—that officer *is* the commander's PA officer, regardless of background or experience. Such a spokesperson should not pick and choose between IO or PA tactics when divergences occur but should approach the task of organizing and executing public communication from a distinctly PA mind-set. Doing so implies a greater degree of advance familiarization with the proper roles of PA and IO for operators identified as spokespeople-to-be.

Develop PA as an Operational Capability

The less Air Force commanders understand about PA and IO, the less they will demand from them in exercises or operations. Low expectations lead to devoting little thought, effort, or resources to maturing PA and IO forces; in turn, the uneven readiness of those forces negatively reinforces commander expectations. Commanders must help break this vicious circle, but PA and IO leaders must offer solutions to their bosses.

The need for top-down reform is more acute in the Air Force PA community—which, for better or worse, is well established—than in IO, which remains a developing organizational concept. Many of the hopes and fears currently borne by IO are more properly carried by our worldwide PA forces: as already noted, a commander's need for PA operations at every level often outstrips the need for IO. Yet PA forces, with full commander support, must better organize, train, and equip themselves to meet this urgent need. Creating the conditions that would allow PA to grow as an operational capability in the Air Force would involve changes large and small. Basically, however, five characteristics define a truly operational PA capability:

- *Full integration in the C2 system.* Each of the Air Force's new war-fighting headquarters needs two types of PA capability in each AOC: a PA-plans element (which integrates information collecting, packaging, and disseminating strategies with the work of the Strategy and Combat Plans Divisions) and a PA-operations element (which mines information systems and specialists in combat operations to identify, collect, and coordinate emerging information relevant to the strategy). Both capabilities require PA forces with training and experience different from those

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supporting traditional media and internal information functions.

- *Rigorous training and evaluation.* The Air Force must augment entry-level instruction at the Defense Information School with training and experience that qualifies PA forces for operational assignments. A tour as an action officer or a commander in an IO or joint strategic-communications organization does not disqualify PA Airmen from future roles as public communicators: we can send these Airmen right back to work with media on their next assignment. More robust PA training and career development then must be validated through tougher inspection criteria. PA must deploy more senior advisers and robust "white cells" to major exercises to provide PA mentoring and realistic, responsive media scenarios.
- *Commitment to assessment.* PA must join with IO to research, fund, and field methods and tools that will give trained but geographically dispersed communication staffs the ability to plug into relevant, ongoing public-survey or content-analysis efforts or quickly develop contingency-specific assessment programs.
- *Better engagement at a regional level.* In peacetime the PA staffs of the restructured war-fighting headquarters should focus on activities largely ignored today: regional PA planning, climate assessment and monitoring, cultural-communications training, and the steady-state engagement needed to build confidence with regional media and opinion leaders during a contingency.
- *Ability to surge quickly to support media response and news generation.* Most steady-state public-communication requirements for Air Force units differ significantly in size and scope from those during a major military operation. Existing air-and-space-expeditionary-force pairs and Air Reserve Component PA authorizations may need reorganizing to create modular capabilities to support surges in traditional media operations and news generation—the production of strategically aligned multimedia information for rapid dissemination through both internal and external media. In building this capability, however, it is important to note that a modular capability is not quite the same thing for PA as it is for many capabilities linked to agile combat support. A larger, more active base does not equate to greater required PA support. Instead, we should base the requirement on the unit's projected need in terms of mission supported, public-access restrictions, and the expected information demand of media or community representatives in the region.

Conclusion

In his book on al-Qaeda, veteran Middle East reporter Jason Burke describes the importance of jihad, martyrdom, and "the spectacular" to the "revolutionary vanguard" of Islamic extremists: "By using modern communications the vanguard in self-imposed (and more secure) exile can reach out to the population at large without the possibly compromising, and lengthy, process of mobilization through grassroots organization and activism."[11] The global war on terrorism aims to eliminate the various physical safe havens from which this vanguard can operate, but, as we have been warned, the process is a slow one. While that long struggle is under way, we cannot neglect to engage the enemy in his virtual safe haven: a global-information environment where extremists build the credibility they need for recruiting, financing, and establishing other forms of support.

To the extent that we can employ or develop IO capabilities to engage the enemy in this environment, we should do so. Barring quantum leaps in capabilities and changes in US law, however, IO can and should operate only on the margins of foreign public opinion, influencing small numbers of people to promote discreet operational effects. For the

foreseeable future, the messy heart of influence will lie beyond the definite grasp of IO, in the way well-executed PA and public diplomacy shape how our actions are perceived and discussed by media and the cultural groups that collect information from those media.

Resolving the strategic issue of how to organize, train, equip, and employ our diverse public-information capabilities to maximum effect is not something the Air Force can put on the back burner. The less Airmen understand PA and IO—insofar as we see communication as a distraction from the business of war fighting rather than an essential precondition for the use of force—the more we put war fighting itself at risk. ❑

Notes

1. Thom Shanker and Eric Schmitt, "Hearts and Minds: Pentagon Weighs Use of Deception in a Broad Arena," *New York Times*, 13 December 2004.

2. "Policy on Public Affairs Relationship to Information Operations," Chairman of the Joint Chiefs of Staff Memorandum CM-2077-04, 27 September 2004; and "Telling the Truth, Especially in Wartime," Professional Standards Advisory PS-5, Public Relations Society of America, 31 January 2005, http://www.prsa.org/_News/leaders/ps50114.asp.

3. In just one example of the trend, the 25 March 2002 issue of *PR Week* reports a study by Bob Williams, an ethics fellow at the Poynter Institute, indicating that media use of official spokespeople as primary sources in news coverage rose 81 percent between 1995 and 2000.

4. For a more detailed consideration of the role of credibility for PA, see the author's article "Planning for Legitimacy: A Joint Operational Approach to Public Affairs," *Chronicles Online Journal*, 10 June 2005, http://www.airpower.maxwell.af.mil/airchronicles/cc/sholtis.html.

5. See, for example, Sig Christenson, "Viewers Don't Always Know Source of Footage," *San Antonio Express-News*, 13 March 2005.

6. Air Force Doctrine Document (AFDD) 2-5.3, *Public Affairs Operations*, 24 June 2005, 2.

7. Joint Publication 3-61, *Public Affairs*, 9 May 2005, especially chap. 3, par. 4.

8. For example, see Col William M. Darley, "Why Public Affairs Is Not Information Operations," *Army Magazine* 55, no. 1 (January 2005), http://www.ausa.org/armymagazine.

9. The split between AOC and AFFOR staffs as the two primary components of a JFACC's war-fighting capability is described in the "Air Force Forces Command and Control Enabling Concept," change 1, 7 March 2005. Paragraphs 7.4 and 9.2 define the basic organization of the war-fighting headquarters staff into an AOC and AFFOR staff. Paragraph 9.5.7 lists IO as a specialty team within the AOC. Although paragraph 9.7.11.4 specifies that PA "maintains a support team within the AOC," it remains to be determined what this statement means for the PA manpower footprint in the AOC's unit-type-code baseline, the chains of command for PA personnel operating inside and outside the AOC, and the prerequisites needed to incorporate PA staff into the AOC weapon system.

10. The example derives from the consideration of just one variable of media content, whereas a more complex analysis would need to encompass multiple variables through the entire course of an operation. The author's online article cited in note 4 outlines one possible assessment system based on four components of a military operation's perceived legitimacy.

11. Jason Burke, *Al-Qaeda: The True Story of Radical Islam* (New York: I. B. Tauris & Co., Ltd., 2004), 34.

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Quick-Look

The Combat Aviation Advisory Mission in Iraq

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UNTIL RECENTLY THE greatest contribution of combat aviation advisory (CAA) involved keeping "brushfires" from flaring into "multiple fire-alarm emergencies." In other words, CAA worked best when applied in support of host-nation assistance before a major contingency developed. Even though the current situation in Iraq does not follow this model, in reality, Operation Iraqi Freedom brings to the forefront the idea that the Air Force must increase its CAA capacity in order to support long-term US objectives. In fact, CAA will prove critical in the development of a credible Iraqi counterinsurgency (COIN) capability.

Few people would argue against the enduring value of CAA's mission, which, according to some Air Force advocates, must expand to three or four times its current size. While no one disputes the importance of CAA in countries such as the Philippines and Colombia, apparently most Airmen—including the most fervent supporters of the CAA mission—fail to understand the need to introduce a robust CAA capability to Iraq. Although one could use operations all over the world to justify CAA's growth, Iraqi Freedom demonstrates the absolute urgency and value of the organization. Unfortunately, CAA has had little effect on the current situation in Iraq. Since CAA is unique to the Air Force, it makes sense for Airmen to train Airmen.

Multinational Force-Iraq (MNF-I) understands that the training, mentoring, and development of an Iraqi security apparatus are mechanisms for building indigenous legitimacy and diminishing the need for coalition forces in Iraq. In the end, historical evidence suggests that properly composed and trained indigenous forces are most effective in defeating an insurgency. Since such long-term endeavors as COIN operations are best fought by indigenous rather than third-party forces, the United States would do well to develop a sound disengagement strategy from Iraq. In the not-so-distant future, US bombs dropped from US aircraft will signal failure in our campaign strategy to de-Americanize COIN operations in that country.

To accommodate the shift from an American-led COIN to an all-Iraqi capability, MNF-I developed Multinational Security Transition Command-Iraq (MNSTC-I) as a major subordinate component. Iraqi security forces will soon mature in capability, and coalition forces can then lower their footprint in Iraq—all because of MNSTC-I's emphasis on the development of those security forces. As their numbers and capabilities grow, Iraqi ground forces (military and police) have begun assuming a more leading role in COIN operations.

Such is not the case for the Iraqi air force. While the country's ground security forces now boast upwards of 180,000 personnel, its air force has experienced nominal growth from 162 personnel to 500-plus airmen only recently. The air force began accepting aircraft from a number of different countries, concentrating on intelligence, surveillance, and reconnaissance; airlift; and VIP support. Strategically, as part of a greater campaign plan in Iraq, the United States has a vested interest in the Iraqi air force's successfully assuming air-component responsibilities of indigenous

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COIN operations to defeat the insurgency and establish internal order for the "new" Iraq. Complicating matters, although MNF-I has an air component coordination element and Multinational Corps-Iraq has an air liaison officer as the principal advisors and liaisons from the coalition force air component commander (CFACC), MNSTC-I has no formal liaison with the CFACC. The CFACC is aware of this issue, and Central Command Air Forces (CENTAF) is trying to rectify it.

The bottom line is quite simple. Because airmen know best how to develop an air force, US Airmen should assume the leading role in development of the Iraqi air force. Only the 6th Special Operations Squadron (SOS), under combat command authority of US Special Operations Command but solely comprised of USAF Airmen, has a specific charter to conduct the CAA mission.

In order to assess Iraqi airpower, the 6th SOS—the USAF's sole foreign internal defense (FID) unit—should immediately deploy to create a plan for developing Iraq's air force. After all, assessment of foreign aviation forces is one of the squadron's core tasks. Due to the size of the Iraqi air force, current and projected, the USAF need not introduce aviation advisory teams in huge numbers but should do so under the Operational Aviation Detachment Alpha/Bravo concept. This approach will provide a unique advisory team that assists not only in flight training but also in maintenance, supply, munitions, ground safety, life support, and other critical aviation functions. In truth, although some individuals may guess at CAA mission requirements in Iraq, only combat aviation advisors have the wherewithal to assess, train, advise, and assist foreign aviation forces in airpower employment, sustainment, and force integration.

Air Education and Training Command should take the lead in the initial training of Iraqi airmen by establishing their initial specialty schools and providing basic, intermediate, and senior developmental education. However, Air Force Special Operations Command—in particular the 6th SOS—should assume the core tasks of both advisory and direct assistance as well as force integration. This issue requires immediate attention because the USAF must play a leading role in converting the nascent capabilities of the Iraqi air force into valid COIN capabilities, thus giving the Iraqi government a viable air component that can team with COIN-capable Iraqi ground units.

The amount of FID work in US Central Command's area of responsibility would justify expansion of the Department of Defense's CAA forces from one squadron to multiple units, with an entire CAA squadron focusing on Iraq. After all, this is an economy-of-force issue. The ability to advise foreign aviation forces—in effect, assist them in their COIN capabilities—means that we don't necessarily need to commit a large number of US forces to combat emerging insurgency and subversion in countries of interest.

The longer our military delays the expansion of its CAA capabilities, the worse off we will be in Iraq and in the global war on terrorism. Current conventional thinking holds that although Iraqi ground troops may be able to handle land-based COIN operations in the near future, coalition airpower will need to provide close air support for quite a long time. But such reasoning employs faulty logic. By considering the enemy's ability to "spin" information operations, one can clearly understand that the Iraqization of COIN operations must occur in the air as well as on the ground. A lopsided approach that promotes COIN operations with a mostly Iraqi ground component and a mostly United States/United Kingdom air component will backfire as the insurgents continue to use propaganda to exploit coalition contributions in the air. Airmen must create an effective exit strategy that enables a transfer of the asymmetric advantages of the "high ground" to the new Iraqi military structure and reduces the US/UK combat-airpower footprint as soon as practical. ❑

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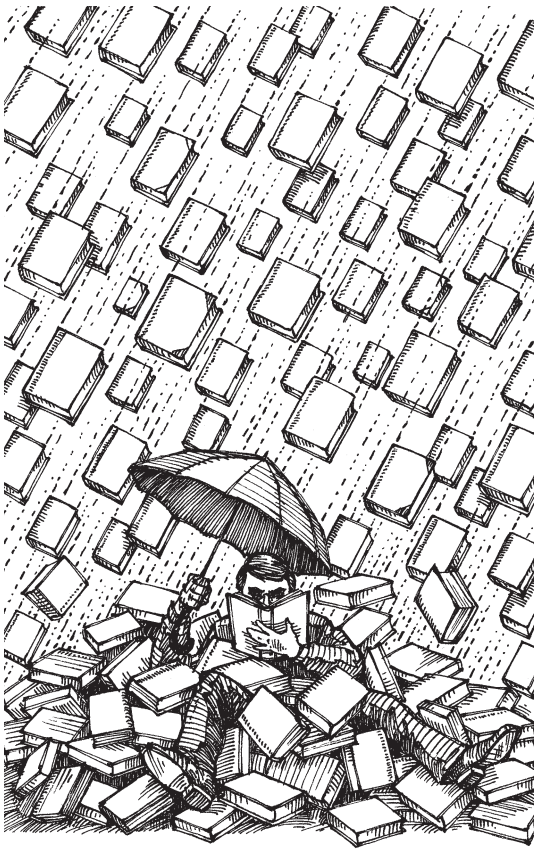
Book Reviews



J'ai été fellagha, officier français, et déserteur: Du FLN à L'OAS by Rémy Madoui. Éditions du Seuil, 27, Rue Jacob, 75006 Paris, France, 2004, 400 pages, $22 €.

Anyone fighting insurgents or building democracy in Islamic countries today can gain useful insights from this memoir by an insurgent who fought in the bloody Algerian War of Independence, 1954–62. Written in French, the book describes one young man's remarkable odyssey during the war in which Algeria freed itself from France. The author became a teenaged Front de Libération National (FLN) guerrilla fighter against the Armée de Terre (French army). He fought as an insurgent for five years until his fellow FLN members, suspecting him of being a spy, imprisoned and tortured him. Escaping his torturers, Madoui defected to the French side and became a French army lieutenant in a commando unit that hunted his former FLN cohorts. Later, as Pres. Charles de Gaulle conceded defeat, the author deserted the army to join the Organization Armée Secrète (OAS), a renegade group led by senior French army officers and others who violently opposed de Gaulle's policy. The author's OAS career proved short-lived when the army soon captured and imprisoned him. He emigrated to the United States after his release.

More than an engaging adventure story, the book is a window into today's insurgencies, describing in detail the FLN's operating techniques, membership, and structure. The FLN began as a popular uprising against French colonialism, espousing democratic principles as it politically mobilized the Algerian people. However, like today's insurgent groups, the FLN consisted of competing tribal and regional factions that engaged in fratricidal struggles for power. As time passed and bloodshed increased, extremist elements gained control of the FLN and killed almost as many Algerians as the French did.

Readers will note that Algerian insurgents had different motivations than the insurgents we face today. The FLN was primarily an anticolonial, nationalist movement in which the Islamic religion played only a secondary role. Madoui's book emphasizes freedom and democracy but scarcely mentions religion. In fact, he devotes nearly 10 percent of it to publishing "The Soummam Platform," an FLN manifesto of 1956 that outlines an ultimately unfulfilled blueprint for a democratic Algeria. Today's insurgents aggressively oppose democracy, but religion is a highly prominent motivation for most of them.

Madoui presents a perspective seldom seen in books about the Algerian war. Readers seeking a broad, scholarly perspective of the conflict can consult Alistair Horne's famous book *The Savage War of Peace*. Accounts by French and Algerian authors tend to be rather impassioned since the war traumatized the French as much as the Vietnam War traumatized Americans. Many French military and civilian leaders have written about the war, but few insurgents have produced accounts that one could consider objective. Rather than glorifying his own actions, Madoui's gritty memoir recounts in vivid

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terms the deaths of many comrades and the severe privations he suffered during a long struggle in deserts and mountains. He bolsters his story's credibility by including the names and photographs of many Algerian and French army people with whom he interacted.

In one sense, the book is a tragic tale of how Algeria missed its chance for democracy when undemocratic elements brutally subverted the FLN's early agenda, yet it also suggests there is no inherent reason why Islamic cultures cannot become democratic. Hopefully an English-language edition of the book will appear soon. In any event, Madoui's account is well worth reading for the insights it gives into contemporary events.

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Pictorial History of the Philippine Air Force: 50th Anniversary, 1947–1997 by Alberto A. Anido and Brian Austria-Tomkins. AVA, P.O. Box 21104, Oxnard, California 93034, 1997, 71 pages, $20.95 (softcover).

Published on the 50th anniversary of the youngest service of the Armed Forces of the Philippines, the *Pictorial History of the Philippine Air Force* (PAF) is a fascinating photo-essay of the 54 aircraft and helicopter types that flew with that air force since its rebirth on 1 July 1947. Beginning with a foreword by Lt Gen William K. Hotchkiss III, the 24th commanding general of the PAF, the book inventories all of the service's aircraft, both retired and active. The aircraft photographs, both color and black and white, appear chronologically, according to the date of the plane's entry into service with the PAF. Additionally, two pages deal with aircraft insignias, unit markings, and nose art.

The first part of the book depicts the postwar days of the PAF (1945–50), beginning with the Douglas C-47, an aircraft that served well into the 1980s as both transport and bomber. The fighter force consisted of North American P-51D Mustangs, which saw action during the counterinsurgency campaign of the 1950s. Two other notable aircraft of this time were the Boeing Stearman and North American T-6 Texan, both used as trainers.

The second section covers the jet age, marked by the arrival in 1955 of the Lockheed T-33, utilized by the PAF in training and tactical reconnaissance. Following the Thunderbird two years later, the North American F-86F Sabre saw action not only in the Philippine skies but also in an overseas United Nations mission. The PAF flew the D model Sabre as well. Additionally, the T-28 Trojan, popularly known as the Tora-Tora, entered service at this time.

The final portion, the supersonic era to the present day, begins with acquisition of the Northrop F-5A/B Freedom Fighters and the arrival of the famous UH-1H "Huey" helicopters and LTV F-8H Crusaders (the PAF thus became the second foreign operator of the aircraft, the French navy being the first). Rotary-wing acquisitions during this time included over a dozen Sikorsky S-76 gunships, although some were configured for search and rescue. The 1990s opened with the McDonnell Douglas "Defender" helicopter, SIAI S-211 trainer jets, and Rockwell OV-10 Broncos replacing the T-28s in the counterinsurgency role. The last four pages of the book list the serial numbers of all known PAF aircraft and the fate of those planes.

The late Alberto A. Anido, who served as a PAF Reserve officer, and Brian Austria-Tomkins of Anglo-Philippine Aviation, as well as other contributors, have produced a fine reference publication on PAF aircraft and airpower. I highly recommend it to civilian and military historians, scale modelers, aviation enthusiasts, students, and anyone interested in Philippine aviation.

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Ju 87 Stuka, Combat Legend Series, by Robert Jackson. Airlife Publishing, Stackpole Books (http://www.stackpolebooks.com/cgi-bin/StackpoleBooks.storefront), 5067 Ritter Road, Mechanicsburg, Pennsylvania 17055-6921, 2004, 96 pages, $14.95 (softcover).

Stuka! In the early days of World War II, perhaps no other cry engendered more fear in enemy soldiers and civilians. The images and screaming sirens of the Sturzkampfflugzeug will forever be associated with the blitzkrieg and Germany's loss during the Battle of Britain.

Stackpole Books, in association with Airlife Publishing of England, has made yet another addition to its wonderful Combat Legend series. The author, Robert Jackson, who has over 70 books to his credit, does a wonderful job of giving a snapshot of the Ju 87. The book's four color and 82 black-and-white photographs; 17 very nicely drawn color plates of Stukas used in different campaigns; and one grayscaled, three-view drawing of a Ju 87B-2 flown on

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the Russian front by Maj Helmut Bode in June 1942 will appeal to both modeler and historian alike.

The author also includes detailed information about different dive-bomber prototypes, the Stuka's operational history from the invasion of Poland, the Battle of Britain, and the war in North Africa and the Mediterranean. Furthermore, Jackson discusses the aircraft's role as a tank buster on the Russian front, where Hans-Ulrich Rudel, for example, destroyed 519 Russian tanks in his Stuka mounted with twin 3.7 cm cannons. Readers will find additional information on the Stuka designers, some of the men who flew the aircraft into battle, the weapons used, production figures, and a list of foreign countries that used the Stuka in combat.

This book is well worth the reader's time. Granted, the text is brief, but the author adds enough material to provide a feel for the Stuka's incredible significance during the war. *Ju 87 Stuka* will make a nice, affordable addition to anyone's aviation library.

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The United States Air Force and the Culture of Innovation: 1945–1965 by Stephen B. Johnson. Air Force History and Museums Program (http://www.airforcehistory.hq.af.mil/publications.htm), 200 McChord Street, Box 94, Bolling AFB, Washington, DC 20332, 2002, 288 pages, $30.00 (softcover). For sale by the Superintendent of Documents, US Government Printing Office (http://www.gpoaccess.gov/index.html), 732 N. Capitol Street NW, Washington, DC 20401.

Systems management—a common phrase in today's US Air Force (USAF)—has been part of the service lexicon for a while. With the exception of the true practitioners, most people have little understanding of its origin. Stephen Johnson's study *The United States Air Force and the Culture of Innovation: 1945–1965* provides a detailed explanation and more.

Johnson defines systems management as a set of organizational structures and processes whose goal is to rapidly produce a novel but dependable technological artifact within a predictable budget. His main purpose is to demonstrate how the application of systems management by the USAF to its ballistic-missile and computer programs produced critical new weapons and benefited American industry.

Starting in the mid-1940s, when the USAF developed its organization and processes for complex technology development, and continuing through two decades, one officer was at the center of events: Gen Bernard Schriever. A critical, strategic bridge between the technologies and the USAF, he helped introduce the three major methods created to deal with complex technologies: operations research, project management, and systems engineering.

Schriever was the key mediator who transformed the methods into standard processes in the USAF and the Department of Defense (DOD). More than any other person, he deserves the credit for merging scientific and engineering vision with military procedures to create methods now standard throughout the DOD. His staff combined operational requirements with technologies, strategies, and goals to establish for future systems. "Technology push" prevailed over "requirements pull."

The author also discusses a number of well-known nonprofit organizations that began during this period to address USAF needs and avoid conflicts of interest. They include RAND (the first so-called think tank), Analytical Services Inc., Systems Development Corporation, Massachusetts Institute of Technology Research Corporation, Space Technology Laboratories, and Aerospace.

Johnson interviewed principal participants from this period and documents his research well. Yet, despite explanations of terms and concepts, the average reader will need a scorecard to avoid getting lost in acronym overkill. Adding to the confusion, many acronyms used then are similar to current acronyms but have totally different meanings.

Since its inception, the USAF has depended on advanced technologies to maintain an edge over actual and potential enemies. Continuous innovation was a way of life, and USAF leaders learned quickly to foster productive relationships among their service and the scientists, engineers, and industry leaders who build the aircraft, missiles, computers, radar systems, and other technologies on which they depend.

Unless one can appreciate what happened in these areas and how it affects much of the modern USAF, this will be a difficult read. *The United States Air Force and the Culture of Innovation* is a useful, comprehensive study, but it is not for everyone.

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The Future of the Australian-U.S. Security Relationship by Rod Lyon and William T. Tow. Strategic Studies Institute (http://www.carlisle.army.mil/ssi/index.cfm), US Army War College, 122 Forbes Avenue, Carlisle, Pennsylvania 17013-5244, 2003, 50 pages. http://www.carlisle.army.mil/ssi/pdffiles/PUB50.pdf.

As Australia changes its status from a regional ally to one of America's few global allies, relationships and defense arrangements must change and adapt. Whereas New Zealand never recovered from its antinuclear stance that distanced it from the United States, Australia has continued its 50-year relationship with us. Having contributed forces to the fighting in both Afghanistan and Iraq, Australia now understands the hostile nature of Asian affairs—especially after the Bali attacks in 2002—and realizes it needs American support to contain the arc of instability that has invaded the South Pacific islands. The authors point out that the change for Australia began when it shouldered the largest share of the burden in stabilizing East Timor in the 1990s. Although it backed up Australia, the United States declared that that country had to police its own backyard. Australian forces remain in New Guinea and Guadalcanal attempting to engage in nation building as the societies there cope with failed states and policies. Australian politicians, at least those currently in power, believe that the Asian and global environments have so shifted at the start of the twenty-first century that Australia must also shift; the major constraint, as in other countries, is funds for military expenditures.

Because of the maritime approaches to the Australian continent and the focus of the US Army on Korea, Australia seeks interoperability with the US Marine Corps. The authors also concentrate on various weapons systems on the books in Australia and their fit into the new global strategy of the Australian Defense Forces. The F-111 fleet may retire early to free up funding for the Joint Strike Fighter, and the Australian army requires a new battle tank. Australia's ability to become a meaningful contributor to American-led global operations will depend upon its willingness to create and maintain a wide array of high-technology forces. Not only must it have airlift to give its forces global reach, but also it must shed its commonwealth thinking about fighting no further than Singapore.

Speculation concerning basing and movement in the vast Asian region also enters into the debate about what role Australia could and should play. US policy itself has not matured to a point where America has formally asked Australia to provide basing for either forces or equipment. Furthermore, as the United States finds itself confronted by a larger global war on terrorism, Japan may enter into more than talks with Australia and America. Worried about instability and threats emanating from China, Japan desires Australian and American cooperation to assist it with policies and an Asian defense framework. The doctrine of interdependence with the United States will continue to be the dominant defense policy for Australia.

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In Command of History: Churchill Fighting and Writing the Second World War by David Reynolds. Penguin: Allen Lane (http://www.penguin.co.uk), 80 Strand, London, WC2R ORL, 2004, 672 pages, £30.00 (hardcover).

David Reynolds has done it again. *In Command of History* is a book about the writing of six books—Winston Churchill's multivolume memoirs about his experiences in World War II, to be exact. In this carefully researched and nuanced study, Reynolds shows that this once and future prime minister wrote his account with three different considerations in mind. First, like any author, he wanted to make money. Churchill was fully aware that fame is a fickle thing and that he needed to strike quickly if he wanted to maximize his profits. Second, like any major political figure, he wanted to defend decisions he had made. Finally, and unlike most political memoirists, he wrote with an eye to his political future. He was still an active member of the House of Commons and often molded his writings to service his political interests as he saw them in the late 1940s and early 1950s.

The author's detailed account shows that Churchill made a small fortune from these memoirs that ranged—depending on inflation and currency exchange rates—between 18 and 50 million dollars. Although this account is highly informative, the book is more impressive in its breadth than in its depth. His central argument that the writings of Churchill the historian shape our understanding of Churchill the politician seems rather obvious. Reynolds offers a number of careful discussions of the controversies that involved Churchill during his time at 10 Downing Street and the way that these volumes influence public understanding of those incidents. As summaries of current knowl-

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edge, the passages are quite good, but little in them will strike specialists as particularly new.

Still, *In Command of History* is an entertaining read that military professionals can profitably consult. It shows how history is "made" and influenced. Few readers of this journal will ever have the influence of Churchill, but some might have some interesting stories to tell. This book would serve as a good training manual for people considering a writing project after they leave active duty.

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A Question of Loyalty: Gen. Billy Mitchell and the Court-Martial That Gripped the Nation by Douglas C. Waller. HarperCollins Publishers (http://www.harpercollins.com), 10 East 53d Street, New York, New York 10022-5299, 2004, 448 pages, $26.95 (hardcover).

The trials of O. J. Simpson, Kobe Bryant, and Scott Peterson held the attention of the entire country, but they are hardly a new phenomenon. Long before the development of *Court TV* and the 24-hour news networks, Americans were interested in the legal troubles of the famous and infamous. For reasons that defy explanation, we are inveterate observers of others' misfortunes, whether deserved or not. Trials are the legal versions of car wrecks or fires. We are drawn to them like moths to a flame. *A Question of Loyalty* tells the story of a trial that held the nation spellbound in the fall of 1925. Not merely a trial, it was a court-martial, which combines the elements of criminal law with military discipline.

Billy Mitchell had acquired national and international fame when the Army brought him up on charges. This war hero and aviation pioneer forged his career by aggressively pursuing his own agenda to advance military aviation as he divined it. After over 25 years in the service, Mitchell had risen to the temporary rank of brigadier general as the Army's assistant director of the Air Service—a position attained by being his own man, according to some sources. Others would describe this trait in terms of his refusal to be a team player.

Born and raised in privilege, Mitchell was a childhood playmate of Douglas MacArthur. With the outbreak of the Spanish-American War, he enlisted in the same militia regiment that his father served in during the Civil War. Through his father's political connections, Mitchell soon received his commission as a signal officer. His stellar performance in a series of assignments, including the Philippines, marked him as a man with a bright future in the Army. Before World War I, he learned to fly and became an aviator—a normal course of events since military aviation was an arm of the Signal Corps at the time.

When the United States entered the war, Mitchell shipped out to Europe, virtually took command of the fledgling American Air Service, and developed his ideas about the primacy of military aviation. When the war ended, his head was full of ideas about how to advance and gain the independence of the aviation arm. Mitchell would let nobody stand in his way, and he didn't care whose toes got smashed in the process.

Author Douglas Waller effectively explains how Mitchell's dedication to this cause brought him fame in military and civilian circles but alienated a large contingent of soldiers, sailors, and politicians. His hard-line quest for the expansion of military aviation encroached on many others' turf. Mitchell's inability to work within the construct of Army bureaucracy finally resulted in removal from his War Department position and exile to Fort Sam Houston, Texas—considered a backwater post. Along with his reassignment came a reduction to his permanent rank of colonel. His removal and demotion left him truly rankled.

Mitchell did not suffer embarrassment well, and his reassignment did not shut him up. In Texas he continued to needle the system by writing articles, books, and speeches critical of anyone or anything that opposed him. Although this commentary was well received by the public, the Army bided its time, waiting for him to stumble. Stumble he did after the tragic crash of the Navy's airship *Shenandoah*. Just days after the accident, Mitchell issued a public broadside in which he indicted the Army's and Navy's management of military aviation as "criminally negligent" and "almost treasonable." This statement caused a firestorm in the press that Mitchell expected would result in his recall to Washington so that he could clean up the mess he blamed on others. He was in fact summoned to Washington—to face a court-martial.

Bringing this human drama to life, Waller tells a spellbinding story equal to the best courtroom fiction. He expertly interweaves the details of Mitchell's personal life and military career with the suspenseful events of the seven-week trial. Even military readers familiar with the story will find themselves entertained and educated by this account.

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As good as this book is, readers must remember what it is not. It is a courtroom drama—not an exploration of the limits of free speech in the military. Waller merely touches on the subject. Furthermore, it is not a treatise on the place of airpower in military operations. Although that question casts a shadow on the entire proceedings, it too remains largely unexplored. Nevertheless, the book stands on its own merits without entering into these controversies.

Additionally, readers may find the explanation of Mitchell's relationship with Douglas MacArthur less than satisfying. Both grew up to become heroes whose careers were tainted by charges of insubordination. Interestingly, MacArthur sat on the court-martial board that convicted Mitchell. The author briefly discusses MacArthur's performance in the court-martial but does not go into detail, instead referring readers to biographies of the general. Regardless of any such deficiencies, readers of this journal will find this real-life courtroom drama full of suspense and worthy of their attention.

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Researching National Security and Intelligence Policy by Bert Chapman. CQ Press (http://www.cqpress.com), 1255 22d Street NW, Suite 400, Washington, DC 20037, 2004, 400 pages, $130.00 (hardcover).

Anyone who has ever had to write a research paper of any type has wondered, "Where do I start?" Well, if your subject is even slightly related to national security or intelligence, both here and abroad, you no longer have to wonder! *Researching National Security and Intelligence Policy* is a veritable cornucopia of sources and ratings of their effectiveness. What may prove even more useful is the extent of each chapter's documentation. These endnotes, which attest to the author's thoroughness, include Web sites and e-mail addresses where appropriate. The book's user-friendliness also helps a great deal.

Chapman has included five chapters on government agencies as well as chapters on independent and intelligence agencies; congressional agencies; commissions' advisory organizations; legal and regulatory resources; research institutions and think tanks inside and outside Washington, DC; and foreign-government organizations and research institutions. He concludes with a chapter on selected indexes, journals, series, and scholars, together with an extensive guide to acronyms as well as a 30-page index.

The author has done yeoman's service to writers within the defense and national-security arena. The perishable nature of material contained in source works such as *Researching National Security and Intelligence Policy* requires periodic updates. One can only hope that such plans are already in the works. For now, this work is current and highly recommended.

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At Hitler's Side: The Memoirs of Hitler's Luftwaffe Adjutant, 1937–1945 by Nicolaus von Below. Stackpole Books (http://www.stackpolebooks.com/cgi-bin/StackpoleBooks.storefront), 5067 Ritter Road, Mechanicsburg, Pennsylvania 17055-6921, 2004, 256 pages, $19.95 (softcover).

If you read any World War II book about Adolf Hitler, this should be it. Period. Nicolaus von Below's firsthand account of eight years as Hitler's Luftwaffe adjutant gives the reader not just an inside perspective of the Third Reich's leadership, but tremendous insight into Hitler's persona as well.

Von Below suggests that Hitler was not the psychopathic maniac history would have us believe; rather, he was a compelling speaker, a visionary man, and an extremely well rounded individual who could easily converse on a number of subjects ranging from art and science to international politics: "I never perceived in Hitler any mental inflexibility or arrogance. . . . His memory was very good and his knowledge of many subjects such as music, history, and the natural sciences above average. He was self-taught, but this self-education had been continuous over decades and had an unusually broad basis" (p. 82).

We also see that Hitler had a small and fairly stable circle of staff and advisors that remained with him until the end of the war, despite whatever differences he may have had with them. Take, for example, Hitler's loyalty to Hermann Göring, who, despite demonstrated operational incompetence and disagreement with the Führer, remained commander in chief of the Luftwaffe until the final weeks of the war. Von Below also captures Hitler's dedication to Benito Mussolini, despite his clear distrust of the Italian fascist ruler, as well as the rise (and sometimes fall) of many German flag officers

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in Hitler's eyes, including Erwin Rommel, Erich von Manstein, and Albert Kesselring.

Lessons of airpower abound here. By war's end, we see the consequences of national priorities such as the manufacture of aircraft versus tanks or flak guns, internal production priorities of bombers versus fighters, changes in operational strategies during campaigns (e.g., the Battle of Britain), and even views of the Luftwaffe's utility (as a ground-attack weapon rather than a force that controlled the air [p. 19]). Von Below eagerly highlights the Luftwaffe's successes (including blitzkrieg operations in Poland and France and at times against the US and British bombing campaign), makes points for improvement, and criticizes shortcomings that ultimately helped seal its doom.

As a staff officer with experience at various levels of headquarters, I empathize with some of the author's situations and unpleasant tasks. His dealings with Hitler were not unlike those of any trusted staff or executive officer's tasks today: keep the boss informed, serve as a confidant or sounding board, and remain discreet when the situation calls for it. Von Below clearly had Hitler's ear, not just about Luftwaffe matters but also the course of operations. The frustration of making a valid point but then seeing decisions take another direction would have been almost heartbreaking to him.

Interestingly, von Below actually rewrote the book years after the war. He had kept an intricate journal during the war, which he, his wife, and close associates destroyed before war's end. Von Below then rewrote these detailed notes after his capture, folding in letters to his wife, uncle, and other friends and associates. He precisely recollects meetings, events, and Hitler's interactions. Von Below takes pains to note that he never agreed with the Nazi philosophy; however, his initiation to the party required swearing an oath to support it. Taking the job as Hitler's Luftwaffe adjutant was an extension of that oath. Both Göring and Hitler knew about this disagreement but valued von Below's ability to provide valuable service to Hitler. Indeed, the reader sees this conviction to duty throughout his writing, despite his waning optimism for a German victory: "I realized that the mutual relationship of trust that had developed between us had blinded me to the black side of [Hitler's] regime. I saw that he alone prevented the end to a struggle which had become pointless" (pp. 11–12).

Von Below cites key speeches that illustrate the Führer's ability to stir German nationalism, draw into its conservative base, and stoke the Germans' smoldering emotional fires. The populace continued to believe in Hitler, despite the eventual bombing and destruction of their cities, the devastation of industry, and the Allied advance on Germany in 1944–45. Speaking of Hitler's radio addresses to the German *Volk*, particularly one address on 30 January 1945, von Below writes, "Many of his listeners still clutched at the straw of the 'miracle weapons' which would turn the tide at the last minute" (p. 227).

This book paints a clear picture of a national leader who can appear composed, competent, and capable, yet still lead a country and its people to doom. As staff officers, we have the responsibility to be good stewards to our nation and its citizens. Rhetoric and feel-good speeches need to stand aside so that issues and possible solutions can come to the fore. We must balance paranoia and fear with reason. Von Below shows us that clouding issues and solutions with glitz and hype should serve as a warning that something deeper and potentially sinister may be afoot.

At Hitler's Side should appeal to staff and executive officers at all levels of the armed forces. It offers a tremendous reading of history and great insight into one of the twentieth century's most charismatic and sinister leaders, as well as his methods, styles, and the people with whom he surrounded himself. Von Below's book is a must-read that anyone will enjoy and remember—I guarantee it.

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Development of the B-52: The Wright Field Story
by Lori S. Tagg. History Office, Aeronautical Systems Center (http://www.ascho.wpafb.af.mil), Air Force Materiel Command, Wright-Patterson AFB, Ohio 45433, 2004, 144 pages, $67.00 (softcover).

Much has been written about the Boeing B-52—deservedly so, not only because the Stratofortress continues to serve a half century after it became operational, but also because it has played a significant role in combat during this period. Students of aviation will find this offering refreshing, for Lori Tagg presents a good documented study that focuses on the Air Force's role in the development of the bomber.

Attractively presented—8.5 by 11 inches on slick paper—the book includes numerous photographs, many never seen before, along with three views of the various versions that led up to the operational bomber. A number of appendices contain organizational charts of Wright Field, Ohio, and the vari-

ous design requirements that shaped the bomber. Readers will also find the bibliography and extensive footnotes useful.

Tagg begins with the well-known story of Boeing engineers coming up with the swept-wing and jet design for the B-52 (from the previous straight-wing version powered by turboprops) over one weekend in October 1948. A good story, it allows her to make the point that this oversimplified view shows how the Air Force's role in the bomber's development has been slighted. Tagg mainly draws on primary sources and makes good use of interviews. She particularly depends on Lt Col Henry Warden, chief of the bomber branch at Wright-Patterson AFB, Ohio, from 1945 to 1950, and thus more or less the Air Force program manager of the aircraft. According to her, the interviews with Warden form the backbone of the book, which lives up to its title and subtitle and pays considerable attention to bureaucratic fights. A brief concluding section deals with the aircraft's operational use.

Tagg makes clear that the B-52's development was not simple. Boeing, Wright Field, Strategic Air Command, and the Air Staff continually pulled and pushed the design in different directions. This was a trying time for Airmen as they gained their independence, demobilized from the huge wartime establishment, and began the conversion to jets. They wanted a heavily armed bomber large enough to carry the five-ton atomic bomb to intercontinental ranges at high speeds. But since air-to-air refueling had not been perfected, much less adopted, Airmen believed that only prop-powered aircraft would have the required intercontinental range. Boeing won the initial competition in 1946 with a design that looked like an enlarged B-29 featuring six turboprop engines and five turrets mounting a dozen 20 mm guns. We know, of course, that this design evolved, but it is less well known that the B-52 came close to cancellation on more than one occasion. The author notes the infighting at Wright Field between the bomber branch and laboratories, especially over the issues of propulsion (as one might expect, the propeller people fought tooth and nail to retain props) and armament. The two key decisions made against the laboratories' recommendations called for switching to jet propulsion and reducing armament to only a tail turret.

Tagg does an excellent job, but the book has a few shortfalls. As a chronicle rather than a narrative, the study does not lend itself to smooth reading; nevertheless, it is effective. More significantly, one wishes Tagg had included analysis and conclusions. Further, she does not address a number of questions of interest, such as the reasons for the B-52's initial success and longevity; lessons learned that the Air Force used later in bomber development (as well as lessons that it should have learned and applied); and the connection among Boeing's B-47, civilian jet airliners, and B-52.

We know that the B-52 was a tremendous success, and now we have a fuller picture of how that happened. Tagg and the Aeronautical Systems Center (ASC) History Office are to be complimented for this fine addition to the literature. They promise a succeeding volume that will cover B-52 modifications and weapons. If it matches the high quality of this effort, it will indeed be greatly appreciated. We can only hope that the author's success with this volume will encourage the ASC and other Air Force history offices to produce similar works on other important aircraft, missiles, and weapons.

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U-Boat War Patrol: The Hidden Photographic Diary of U564 by Lawrence Paterson. Stackpole Books (http://www.stackpolebooks.com/cgi-bin/StackpoleBooks.storefront), 5067 Ritter Road, Mechanicsburg, Pennsylvania 17055-6921, 2004, 208 pages, $34.95 (hardcover).

This is the story of German U-boat U564, which sortied into the Atlantic on 11 July 1942 for a World War II mission and returned to port on 18 September 1942. There are many photographs in the book; in fact, the coincidental recovery of the photos is the primary reason the book was published. They were found in the U-boat bunks in Brest, France, soon after Allied troops occupied the town. The soldier who found them kept them in his house in England for about 50 years until they were rescued by the author. Research on the origin of the photographs indicated they were made by Propaganda Kompanie Maat Haring for the German newspapers and film industry during the war. War photographers were often sent on combat missions, especially those of the so-called ace commanders. The commander of U564, Reinhard "Teddy" Suhren, was a legend in his time just like Erich Topp, Otto Kretschmer, and Günther Prien. He was awarded the Knights Cross with oak leaves and swords by *der Führer* himself. Suhren made the U564 famous; therefore, the German authorities decided that a mission on his U-boat would fit quite well in their propaganda scheme.

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The 361 pictures that were found tell the mission's story in great detail. In fact the author's research is so thorough that readers get to know the crew members of the U564, and the story takes on a certain intimate atmosphere. The crew seemed to be one big happy family—amazing considering that about 55 men were forced to live together in a very small space under very stressful circumstances. The recovered photos, coupled with Patterson's research, enable readers to witness a rendezvous with another U-boat (U654) and participate in the hunt for convoy OS34, where Suhren successfully fired four torpedoes and sank two ships. Readers also see how the German U-boats extended their endurance by refuelling and rearming at sea from another U-boat—in this case the U463, a specially designed tanker known as a *Milchkuh* (milk cow). The photos of the rearmament provide a good idea of the hard work on a U-boat in war. But as other pictures show, it was not all hard work. If the chance of discovery by aircraft were small, the crew was given time to relax with a refreshing swim in the Atlantic.

At the time of this mission, the outcome of the Battle of the Atlantic—soon to be lost by the Germans—hung in the balance. The U-boats appeared to be extremely vulnerable to aerial attack, but the Allies had not yet found the proper strategy to fight the U-boat menace. There was an "air gap" in the mid-Atlantic that Allied aircraft could not reach due to their somewhat limited operational range. The U-boats were safe within this gap, and that is where they usually refuelled and rearmed. Once this gap was closed by use of aircraft carriers to accompany convoys, Coast Guard aircraft, and radar and sonar technology, the German U-boats lost the Battle of the Atlantic. In fact about 60 percent of all U-boat losses during World War II took place in the period from mid-1943 to the end of the war, and of the 614 U-boats that were lost in battle, 264 were sunk by ships and 250 by aircraft. One may conclude that the Battle of the Atlantic was largely won by airpower.

Ironically the U564 was destroyed by a Whitley patrol aircraft on 14 June 1943 in the Gulf of Biscay, taking 28 of her crew down with her. Reinhard Suhren was no longer commander; he was relieved 1 October 1942 and assigned to train young U-boat commanders. He survived the war and died in 1984 of stomach cancer.

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Reconsidering a Century of Flight edited by Roger D. Launius and Janet R. Daly Bednarek. University of North Carolina Press (http://uncpress.unc.edu/default.htm), 116 South Boundary Street, P.O. Box 2288, Chapel Hill, North Carolina 27515, 2004, 300 pages, $19.95 (softcover).

Multiple-author volumes from a symposium are notoriously uneven and difficult to review, but this look at the past century of aviation in the United States is decidedly worth reading. A helpful introduction stakes out the areas covered: the technology of flight, civil aeronautics and government policy, aerial warfare, and aviation in the national imagination.

Roger Bilstein develops three themes on the technology of flight covering both US and European experience and highlighting areas of US indebtedness to Europe and the economic and social aspects of flight. Roger Launius explores the essential role of government in advancing aviation despite popular reluctance to propound "a centralized, rational, long-term industrial policy" as inherently undemocratic.

Hans-Joachim Braun of the German Army University in Hamburg points out that European aircraft firms were dominated by the military, whereas a greater share of business went to commercial aircraft in the United States, a profound significance for the future of the industry. David Lee offers a rehabilitation of the Hoover administration's corporative approach to airmail via negotiated contracts, which was pilloried by Senator Hugo Black. Black's punitive legislation was repudiated a decade later when the 1938 Civil Aeronautics Act restored limited competition and restricted entry into the struggling US airline industry. W. David Lewis explains the colorful career of Eddy Rickenbacker and his hostility to the Roosevelt administration's Civil Aeronautics Board. William Leary contributes a concise history of the long struggle against deadly airplane icing. Electric heating readily solved pitot tube icing, but wing icing proved more difficult until the development of pneumatic boots. Then propeller and carburetor icing showed that icing danger would continue into the twenty-first century.

Timothy Warnock retells the story of how the close personal relationship of the Wright brothers to the US government was initially highly productive but eventually soured as the Wrights failed to keep up with advances in technology. John Morrow picks up the theme, showing how World War I bred technological advances that left the Wright brothers far behind. He shows no less significantly how the sheer increase in numbers of aircraft changed

the face of aviation. The heroics of individual fighter pilots gave way to increasingly large formations and cooperative tactics but in no way minimized the extreme danger of piloting.

Tami Biddle addresses the issue of strategic warfare in an impressively concise chapter. Despite prewar fears that bombing of civilians would touch off public disorder and antiwar reactions, "public behavior under the fall of bombs was generally admirable." The gap between declared doctrine and actual capabilities was the real problem. The RAF bomber chief admitted that 40 percent of his command couldn't find a target in broad daylight, a fact confirmed by wartime experience. US doctrine expected precision bombing to disable the enemy's economy, but weather and enemy air defenses made this extremely difficult to achieve. Nevertheless, strategic bombing did make a vital difference, largely in diverting effort from enemy ground forces to air defense. David Courtwright reports on how flying became a routine form of mass transportation, especially after the late 1950s when jet airliners marked the final triumph over rail passenger service. He attributes this to the sheer size of the United States as well as improved airline safety, pressurized cabins, and increased higher education resulting in higher incomes. While Anne Goodyear's chapter on the effect of flight on art is interesting, it is perhaps the least successful offering because she opted to discuss only the more extreme forms of fantasy. One can't help suspecting the author has been taken in by the put-ons of the pop artists to whom she attributes a deeper level of appreciation for the "weight and gravity" of human flight.

The final essay by Dominick Pisano addresses the symbolic significance of Lindberg's *Spirit of St. Louis*. He concentrates on Lindy's post-Atlantic triumph in his goodwill tour of Latin America sponsored by the Guggenheim Fund to showcase aviation. The tour was a success, but Pisano wisely recognizes that the popularization of aviation was by no means solely inspired by Lindy's flights. Other factors such as the Air Commerce Act, the Army's five-year procurement program, settlement of the Wrights' patent claims, and the formation of the National Aeronautic Association, among others, played a significant role. For this reader the author's effort to distinguish between Lindy's status as a hero and as a celebrity seems a bit strained.

What are we to make of this compilation? In reconsidering a century of flight, it offers glimpses of numerous aspects of the aviation story—all of them interesting and some particularly insightful—but, inevitably, the coverage is spotty. Discussion of the impact of military procurement is skimpy, the development of helicopters is all but ignored, and naval aviation gets short shrift, to mention but a few of the omissions. These neglects aside, the organizers of the original symposium had an excellent idea in assembling a view of aviation's first century. Whatever its limitations, what they have accomplished is definitely worthwhile.

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Air War over Russia by Andrew Brookes. Ian Allan Publishing (http://www.ianallan.com/publishing), Riverdene Business Park, Hersham, Surrey, KT12 4RG, United Kingdom, 2003, 160 pages, $26.37 (hardcover).

With *Air War over Russia,* aviation writer Andrew Brookes attempts to provide a thoughtful and reliable operational history of the German-Soviet aerial contest for the enthusiast and general reader. The product of this effort is uninspiring. This copiously illustrated survey rehashes familiar matters: the smashing success of the initial Barbarossa attacks, the debacle of the Stalingrad airlift, and the last-ditch bombing campaign in 1944. These are woven together in a sparse narrative of major operations.

The author, like so many, is captivated by German operational virtuosity. Indeed, most of the mere 160 pages are devoted to Nazi operations. The book ends with the summer 1944 defeat of the Luftwaffe, as though the subsequent march of the Red Army to the gates of Berlin is not worth mentioning. Although the book begins by noting the significance of the air war to victory in the East, it makes no effort to explain the relationship of triumph and defeat in the air to the outcome on land, except in vague terms. On the rare occasions when analysis is inescapable, the writer resorts to stock interpretations of the baleful influence of Stalin or Hitler in military decision making. The Germans are judged to have "misused" bombers in the army support role, while the mistakes of the unfortunate Ernst Udet again come to the forefront.

The book's greatest problems lie not with its concept but its preparation. The work is based exclusively on secondary English sources. This is a rather slim base, especially in light of the vast literature in German and Russian and the ready availability of microform sources. Furthermore, even where the body of research in English is very valuable, the author does not note the findings of authors, preferring to comb studies for data instead

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of ideas. He relies heavily on the research and even the words of others, although the debt owed is only quietly acknowledged in the footnotes. Errors, such as reference to the Soviet deputy commander in chief Grigori Zhukov (p. 12) instead of Georgi Konstantinovich, argue for more careful preparation of the text.

Air War over Russia scarcely rises above the mediocre. Enthusiasts and general readers should not grieve too much, for their consolation lies in the still authoritative and very accessible studies of Von Hardesty, Richard Muller, Horst Boog, and Joel Hayward.

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Through Eyes of Blue: Personal Memories of the RAF from 1918 edited by A. E. Ross, DFC. Stackpole Books, (http://www.stackpolebooks.com/cgi-bin/StackpoleBooks.storefront) 5067 Ritter Road, Mechanicsburg, Pennsylvania 17055-6921, 2002, 352 pages, $29.95 (hardcover).

This book is worthwhile reading for those with a deep and abiding knowledge of the Royal Air Force (RAF) and the desire to learn much more at the personal level. It is comprised entirely of anecdotal pieces, each by a different writer, albeit several contributors have more than one entry. Each is marvelously intriguing, ranging from a lady rigger of the Royal Flying Corps writing at age 100 about how she entered her job in 1918 and served as a rigger for five years, to air chief marshals describing air operations on the Northwest Frontier of India, to Norway, to the Suez debacle of 1956.

The collection of stories is organized into three chronological eras: The Birth of British Air Power, 1918–1939; The Second World War, 1939–1945; and the Modern Period, 1946–2002. Each includes a brief introductory passage followed by individual anecdotes from various participants in the event(s) described. Grouped chronologically and by geographical area or the nature of the operations discussed, the articles cover the entire gamut of RAF activity, from university air squadrons to intelligence to special duties.

Ever wonder how the RAF used autogyros? Or what it was like to fly one of the first Meteor jets, described by this pilot as "never a class-act fighter"? There is even something here for the medics of the Air Force, as well as the search-and-rescue folks, the Judge Advocate General corps, and some insight into the staff college in wartime. Veterans of the present war in Iraq may be interested in the RAF Mounted Police serving in Iraq in 1950.

The last section ranges from meteorological activity to aeromedical evacuation duties to combat operations in the Balkans and the desert. The several pieces by women of today's RAF include one by a female air commodore. The "loggies" have their day in the sun as well—a short piece on the future of logistical support for the RAF.

Overall, this is a great coffee-table piece and an exquisite piece of history viewed from the personal level. It presents the history of the RAF, from its birth to the present, for those who desire to understand how individual men and women feel about their service.

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German Air-Dropped Weapons to 1945 by Wolfgang Fleischer. Specialty Press (http://www.specialtypress.com), 39966 Grand Avenue, North Branch, Minnesota 55056, 2004, 250 pages, $44.95 (hardcover).

German Air-Dropped Weapons to 1945 addresses the underpublished area of aircraft armament by comprehensively covering the Luftwaffe's development of weapons from the crude "aeronautical artillery" of World War I to the sophisticated rockets of late 1945. Author Wolfgang Fleischer identifies air-dropped chemical munitions as the most important development in the Reichswehr during the interwar years. Pretending to develop sprays for use on harmful forest parasites, the Reichswehr actually perfected the delivery of toxic gases from Junkers F13 and W33 aircraft. Work in high-explosive bombs continued with the help of the Swedish air force.

Fleischer uses both a technical and tactical approach to describe weapons development during World War II: (1) German improvements to air-dropped munitions and (2) battle events that shaped the development of new and better weapons for the Luftwaffe during the course of the blitzkrieg against the Soviet Union. Interestingly, after the fall of Poland and France, the Luftwaffe had to adapt Polish and French bomb stocks for use on German aircraft since it had exhausted its own stockpile.

The book provides a description and cross section of every bomb the Luftwaffe dropped, includ-

ing demolition bombs, incendiaries, special-dropped ammunition, and canisters. Fleischer catalogues information on 100 bombs, 22 canisters, and 50 of the most important bomb fuses. He also describes the chemical composition of toxic chemicals and explosive bomb fillings used by the Luftwaffe. Although *German Air-Dropped Weapons to 1945* will have special appeal to the World War II specialist and Luftwaffe historian, armament historians will quickly discover that it is a gold mine of information on a little-studied subject.

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Air Power: The Men, Machines, and Ideas That Revolutionized War, from Kitty Hawk to Gulf War II by Stephen Budiansky. Penguin Group (USA), Inc. (http://www.penguin.com), 375 Hudson Street, New York, New York 10014, 2004, 528 pages, $29.95 (hardcover).

In the "author's note" at the beginning of his work, Stephen Budiansky observes that the only way he can tell the story of airpower is to be "quite ruthless" in his decisions on what to omit. While one might take exception to some of Budiansky's cuts, the remaining material forms a compelling story that incorporates many of the key personalities, technological milestones, and key operations that have shaped airpower as it exists today. His unique and meticulous documentation combines with an interesting and entertaining writing style to produce a work of value for fledgling airpower scholars and enthusiasts alike.

The author begins his story in the era immediately preceding man's first heavier-than-air flight at Kitty Hawk. He describes the visions of aerial warfare that so riveted the popular reading public of the day and lays out a fascinating chronology of the technological innovations that resulted in the Wrights' success. The juxtaposition of ideas about aerial warfare with contemporary technology through each of the eras he examines is a strength of Budiansky's work. One quickly grasps a point, which underscores much of the narrative, that—for most of airpower's history—technology has been incapable of delivering on the promises of its proponents.

As the author proceeds into the post–World War I period, a second major theme emerges that helps explain the proponents' failure to deliver on their promises. Budiansky challenges the notion that strategic-bombing theory ever offered the quick and relatively bloodless victories promised by its disciples. He contends that Airmen were converted to strategic bombing not just because of the advantages it seemed to offer, but also because the limitations of their equipment made them powerless to achieve a decisive impact on the battlefield—in those operations we now label "counterland." As a result, Airmen overlooked obvious contradictions between their theories of a morale impact and the actual effects of bombing in World War I. They also overlooked the fact that their technology was incapable of meeting the estimates for bombing precision and destructiveness that they used as baselines in creating equipment-production requirements and doctrine.

Having outlined these contradictions, Budiansky traces their evolution through the Cold War period to Operation Iraqi Freedom. Throughout this discussion, he introduces his readers to technological, organizational, and doctrinal innovations that were supposed to ameliorate the gap between airpower's capabilities and its intended decisiveness but somehow always fell short. It is only in the most recent era that Budiansky feels airpower has come of age. Armed with a precision capability, the likes of which early proponents could only dream about, and equipped with defensive capabilities such as stealth and electronic countermeasures—to reduce vulnerabilities that restricted air operations in the past—airpower has finally been able to achieve what Budiansky believes is its rightful destiny. Airpower has achieved ascendancy through its decisive impact on the battlefield.

Because of the quality of his arguments and the splendid variety of interesting anecdotes and facts that bolster his narrative, Budiansky's work is an excellent addition to the literature on airpower history. That said—even should one agree with his view on airpower's ultimate destiny—one is likely to take exception to some aspects of Budiansky's approach.

This reviewer was troubled by the virtual exclusion of noncombat applications of airpower from Budiansky's discussion. In one of airlift's few appearances in the study, he observes that the airlift of 20,000 troops into Spain was "the salvation of the rebellion." Certainly this points to a strategic effect beyond the battlefield. Was airlift omitted because it did not fit the argument? Reconnaissance and air refueling were given short shrift as well.

More troubling is the author's tendency to stay focused on the English-speaking nations. In a work entitled *Air Power*, one expects a broader inter-

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national view. Certainly there are forays into the international arena, but these routinely come back to a US focus. Budiansky's description of the dawn of jet propulsion serves as an adequate example. He offers an excellent summation of the technological obstacles that were overcome to produce the first British jet-powered aircraft, and then, after taking readers through the development of Frank Whittle's *Gloster Meteor*, he points out that "[a]n experimental German jet had flown two years before Whittle's" (p. 358). There is a similar disconnect in his description of the development of swept wings. After describing the American developments, he adds that the inventor's "credibility was almost immediately bolstered by the discovery that German scientists had independently arrived at the same conclusion" (p. 361).

These are minor detractions, however, resulting more from the author's approach to his topic than any shortcoming in the quality of the narrative. There is more than adequate information for the enthusiastic scholar to pursue these various topics to a more satisfying conclusion. On the whole, Budiansky's book meets the lofty objectives he set for himself. In a little over 400 pages of narrative, he offers a compelling overview of airpower history.

Lt Col Matthew C. Stafford, USAF
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Taming Liquid Hydrogen: The Centaur Upper Stage Rocket, 1958–2002 by Virginia P. Dawson and Mark D. Bowles. National Aeronautics and Space Administration, NASA History Office, Office of External Relations (http://bookstore.gpo.gov/sb/sb-222.html), Washington, DC 20546, 2004, 253 pages, $28.00 (softcover).

The United States' ability to develop liquid hydrogen as a fuel for space-launch vehicles was a critical factor in winning the space race against the Soviet Union. This resulted in many of the incredible discoveries of the solar system and led directly to *Apollo S-II* and the *S-IVB* stages, as well as the development of the space shuttle for quasi-routine access to space. The Centaur's upper stage was developed by the Air Force to increase the payload-delivery capability of the Atlas launch vehicle—to place larger satellites at higher orbits. The Atlas-Centaur program was transferred to NASA in 1961 as part of the Apollo program—to propel the Surveyor spacecraft lander to the surface of the moon.

This book is a continuation of the NASA History Office's effort to document the agency's programs and projects, and is written by Virginia Dawson and Mark Bowles of Case Western Reserve University in Cleveland, Ohio, near NASA's Glenn Research Center (GRC), formerly Lewis Research Center in Cleveland. Ms. Dawson is formerly of the GRC's history office.

The authors address three themes within the book: the Centaur program's survival through many attempts to cancel it; NASA's changing tolerance for risk; and the successful collaboration between the vehicle's contractors and NASA's engineers. The book chronicles the development of the Centaur's upper stage from the time it was transferred to NASA; through successful use on the Atlas and Titan launch vehicles; as an in-space stage that would ride in the space shuttle's cargo bay; and its resurrection for use as a commercial launch vehicle.

As the authors admit, when commenting on manuscript-review criticism from General Dynamics—the Centaur contractor—reviewers, this history is written from the NASA Lewis Research Center viewpoint and is biased towards the contribution of Lewis personnel. Similarly, it minimizes the participation and views of other NASA centers, albeit this reviewer, as an employee of NASA's Marshall Space Flight Center (MSFC), may be overly sensitive to critical comments about MSFC's role in Centaur. It is interesting that NASA's history office would publish a book highlighting the intercenter rivalries and disagreements over the Centaur at a time when the current NASA administrator, Mr. Sean O'Keefe, is pursuing a One-NASA theme to break the parochialism within centers. Perhaps, without knowing or intending it, this book serves to support Mr. O'Keefe's One-NASA policy by demonstrating the detrimental effects of intercenter competition for limited resources, which, during Centaur, led to instances of mistrust and motive questioning.

Unlike the histories of the RL10 (upper-stage engine) by Dick Mulready in *Advanced Engine Development at Pratt and Whitney*, or the Apollo Lunar Module by Tom Kelly in *Moon Lander*, this book provides minimal discussion of Centaur's technical problems and solutions. Instead, it focuses on the programmatic, political, and interpersonal history of the program.

The authors counter an accepted, albeit false, paradigm about NASA's Apollo program in the 1960s—that Congress provided an open checkbook with unlimited resources and no questions asked. As the Centaur program encountered technical difficulties and budget overruns, congressional interest questioned the value of the program and threat-

ened cancellation. The authors allege that some of the congressional interest resulted from MSFC's criticism of the program and competition for resources, without adequately representing their position. It is also interesting to note that the authors interviewed program participants from all the organizations they discuss, with the exception of MSFC, which they repeatedly cite as mismanaging the Centaur program and then trying to get the program cancelled.

The book seems to criticize NASA's changing tolerance for risk and the implications it had for the Centaur program without recognizing that NASA was simply reflecting the changing tolerance for space-flight risk from the US Congress and the American people. The intense scrutiny and concern over putting the Centaur in the space shuttle's cargo bay was not due to any anti-Centaur bias from MSFC or Johnson Space Center; rather, it reflected the intense safety reviews of everything that was being prepared to fly on the space shuttle in the 1985 time frame. To this day, liquid-hydrogen propellant tanks are banned from the shuttle cargo bay because of their high risk of leakage.

This book highlights the development of technical insight by the government during a contractor-development program. However, it lacks specific, detailed examples of how the work and expertise of NASA civil service engineers from all NASA research and space flight centers and other national laboratories were instrumental in the resolution of issues. As the authors correctly point out, NASA has always had more in-house technical capability and more detailed technical involvement by its civil service engineers and managers than an Air Force acquisition program has. For the limited number of high-visibility systems that NASA procures versus the much-larger numbers for a military program, the increased technical insight is probably appropriate.

The Centaur program was one of national importance. NASA's philosophy during this era and the technical experiences and lessons learned by General Dynamics and their subcontractors on this program were later shared with other Apollo-Saturn vehicle contractors. This open exchange of information was critical to meeting President Kennedy's goal of landing on the moon by the end of 1969.

This book is probably of little interest to the general reader; however, Air Force personnel associated with the Centaur upper stage, which is still flying as part of the Lockheed-Martin Atlas V launch vehicle, should read this book to gain a greater appreciation of the Centaur's early life. Another group that will find this book educational is Air Force air-and-space engineering/acquisition specialists. The program management and advanced-technology system-development stories provide lessons upon which to reflect.

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Dresden: Tuesday, February 13, 1945 by Frederick Taylor. HarperCollins (http://www.harpercollins.com/hc), 10 East 53d Street, New York, New York 10022, 2004, 544 pages, $26.95 (hardcover), $15.95 (softcover).

Oftentimes, if a lie is presented repeatedly as the truth, people will accept it as truthful. Such is the case with information surrounding the Allied bombing raids of Dresden, Germany, in February 1945. Just the mention of the city's name in the context of World War II conjures images of a raging firestorm; hundreds of thousands of people killed by asphyxiation or burns; the destruction of a beautiful, peaceful city with no war industry to speak of; and atrocities of Allied fighters strafing terrorized civilian refugees after the bombing raids. Dresden's raging firestorm is true—and the city is indeed beautiful. However, until the publication of Frederick Taylor's book, we knew precious little of the facts surrounding its war industry, its importance to Germany's war effort, and—most of all—the disposition of its population during and immediately after the bombing.

For many centuries, Dresden has held a place of political and military importance. It was the seat of Saxon kings for over 800 years. Drezdzány, as the collection of houses and families was first called, served as the first easily navigable crossing over the Elbe River. Here, the land was fertile and the climate mild—a place where the Saxons prospered. Dresden entered the history books in 1270 when Count Henry the Illustrious moved his seat of governance 12 miles upriver from Meissen. From then on, it has served in many ways as both capital and military strongpoint.

Taylor discusses how Dresden has suffered several prior Phoenix-like episodes in which invaders razed the town and the locals rebuilt. Most notable are the Czech attack in 1429; the great fire of 1694, which destroyed many areas of the city; and the Prussian and Austrian occupations and plunderings, starting in 1745, which culminated in the Prussian siege of Austrian-held Dresden in 1760.

The author also visits Dresden's history as the seat of many firsts and inventions. *Dresdnerin*

Fräulein Christine Hardt invented the brassiere in 1889. The city lays claim as the first place in Europe to manufacture the cigarette, coffee filter, tea bag, and latex condom—as well as squeezable toothpaste. The concept of zoned development has its origins in Dresden. Additionally, it became a key center of the camera and typewriter industries (p. 33). By the early twentieth century, Dresden had become affluent, popular with tourists from Europe and America (known as the "Florence on the Elbe"), and a center of precision engineering and technical industries that served the world.

But allegations that Dresden was solely a city of peaceful culture, blessed with "special status" due to its cultural distinction—as one often hears in references to the 1945 bombing—are completely false. Through the latter half of World War II, Dresden was home to many wartime industries and served as a crucial transportation center for traffic channeling to and from Germany's Eastern Front. In fact, according to the 1942 edition of the *Dresdner Jarhbuch* (*Dresden Yearbook*), "Anyone who knows Dresden only as a cultural city, with its immortal architectural monuments and unique landscape environment, would rightly be very surprised to be made aware of the extensive and versatile industrial activity, with all its varied ramifications, that make Dresden . . . one of the foremost industrial locations of the Reich" (p. 148). Wartime industry included radios, aircraft instrumentation, lenses and optics for use in sights, torpedo tails, ammunition casings, and a host of other specialties that fed into these key programs (pp. 148–53). Rail traffic constantly made its way through the Dresden marshalling yards—military traffic headed for the Eastern Front and boxcars of people destined for extermination camps in Poland. The main roads into and out of Dresden stayed equally busy, not only with military traffic headed east but also, by late 1944, with refugee traffic going west.

On 1 January 1945, the German high command had secretly declared Dresden a "defensive area" (i.e., a temporary fortification). In a sign of the times, though, the once-plentiful flak defenses were moved west to the higher-priority Ruhr industrial area. Also lending credence to the city's illusory special status was a telling lack of air-raid shelters. Dresden had the obligatory sirens, but many residents were forced to rely on basements of seventeenth- and eighteenth-century buildings for shelter. Due to a swelling of refugees, not only from the east but also from previously bombed-out areas in western Germany, Dresden experienced a severe shortage of lodging and a corresponding paucity of air-raid shelters.

Taylor draws upon British war records to recount that the Russians had requested Allied bombing of German lines of communications and had mentioned Dresden by name as one of the targets. He also points out that Allied intelligence agencies had correctly identified the military-related industry in and around Dresden, sometimes down to the company name and street address.

The fall of the Iron Curtain allowed Taylor to exhaustively research records in the former East Germany. These documents have helped to shatter the alleged "truth" about Dresden and its population's fate. In fact, differences between actual casualty figures and the oft-repeated numbers alleged as true death tolls vary by a factor of 10—about 25,000 versus 250,000, respectively. These formerly inaccessible records also show that Dresden had at least 127 different companies directly contributing to the war effort, not to mention untold other smaller companies that the Nazi government had not registered. Additionally, Taylor makes extensive use of interviews of Dresden citizens who survived the attack to glean truthful impressions of the events of 13–15 February 1945.

But Taylor doesn't stop with interviews and local records regarding the attack. His research of records and interviews with personnel from Royal Air Force (RAF) Bomber Command who had a hand in the planning and execution of the raid provides a balanced look from the attacker's point of view. Taylor points out that for the RAF crews, Dresden represented "just another raid." For the RAF operations and intelligence staffers, it was another target to assign for bombing. For Air Marshal Sir Arthur Harris, chief of Bomber Command, Dresden stood as another city on the list of German locales slated for destruction.

Taylor makes his book something more than simply a recounting of history by examining the raid's effect on the conscience of RAF members and British leaders. Time and again, Dresden citizens questioned why the Allies bombed their city (few knew of its extensive military contributions) and how far this Allied "terror bombing campaign" would go. After sifting through records, Taylor shows clearly that the Soviet Union was bent on using Dresden as a propaganda tool against the West by inflating the casualty figures (by a factor of 10) and by promoting a variety of stories—many having some small shred of truth.

Dresden takes the story yet one step further, bringing to the reader a human side of life in the city and the raid's impact on survivors. In sidebars that directly relate to the overall story, Taylor looks at the lives of local Jews, some of whom worked in

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the factories and lived in houses that were bombed. He explores the courage it took to face the raging inferno and relates how people, some of them no older than 10 or 11, simply succumbed to the flames and heat while others made their way to safety. With this personal touch (complete with 16 pages of pictures), Taylor gives much more meaning to this retelling of history.

Readers immediately become aware of the importance and influence of an active and deliberate information-operations campaign. Taylor brings to life the Nazi propaganda effort and the Soviet follow-through, the success of which is obvious (see above). Readers also perceive the struggle of proportionality in an air operation—issues we continue to deal with.

The author best summarizes what occurred in Dresden by describing it as a "raid which went horribly right" (p. 416). The RAF carried out its orders to burn and destroy an enemy industrial center. His book lays to rest many misconceptions about Dresden's fate in those bleak February days. Taylor also does a fantastic job of making us think about proportionality in combat by presenting firsthand results of aerial bombardment in an urban environment. As a clear illustration of a previously cloudy subject, *Dresden* has my vote as a must-read!

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Survival Kit for Leaders by John C. Kunich and Richard Lester. Skyward Publishing (http://www.skywardpublishing.com), 813 Michael Street, Kennett, Missouri 63857, 2003, 222 pages, $21.95 (softcover).

Experienced and effective leaders have an internal leadership checklist they rely on for reference when leading and evaluating both leaders and texts on leadership. I challenge them to check the following topics in *Survival Kit for Leaders* against their personal list: four leader levels—strategic, organizational, direct, and personal; 20 effective leadership characteristics, including listening, enthusiasm, ethics, courage, perseverance, reading people, humor, and vision; quotations from Colin Powell, Hal Hornburg, James MacGregor Burns, Stephen Covey, and *Don Quixote*; and examples of exemplary leaders such as Winston Churchill, Field Marshal Sir William Slim, Socrates, and the courageous Raoul Wallenberg, who saved thousands from extermination by the Nazis.

As Ken Blanchard notes in the book's foreword, "Dr. Lester and Professor Kunich have made their careers as both real-world leaders and as successful teachers" (p. 7). They employ their expertise well by providing thoughtful discussions on mentoring, feedback, leading versus managing, legal pitfalls, and time management.

In addition to providing solid content, Kunich and Lester use an interactive format that is effective for teaching and learning. Each chapter ends not only with a conclusion but also with discussion questions and ideas to promote retention and application. Moreover, they include useful mnemonics, chapter bibliographies, reading lists, and a one-page "pocket" list of leadership skills in the appendix. For the next edition, I would recommend including discussions on team building, consensus building, and differences in leading today as opposed to yesterday and tomorrow. An index would also be useful.

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Luftwaffe X-Planes: German Experimental Aircraft of World War II by Manfred Griehl. Stackpole Books (http://www.stackpolebooks.com/cgi-bin/StackpoleBooks.storefront), 5067 Ritter Road, Mechanicsburg, Pennsylvania 17055-6921, 2004, 80 pages, $29.95 (hardcover).

Interest in the Luftwaffe during World War II has not waned—witness the recent publication of Manfred Griehl's *Luftwaffe X-Planes*, which focuses on the German air force's testing centers from Rechlin near Berlin and Cazeaux in occupied France to Derna in Tunisia, listing the major activities at each center. The amount of testing and prototyping that went on during the war will astound readers, but one must remember that the Luftwaffe, like any other military service, was attempting to adapt to changing tactics and battlefield conditions prior to introducing new aircraft types. Griehl includes illustrations of very high quality that will help modelers and historians alike. Indeed, new pictures obtained from archives and other unpublished sources make this book unique. Photos of aircraft such as the Ar 234 jet bomber towing a load-carrying air trailer are among the many highlights readers will enjoy. *Luftwaffe X-Planes* is a must for any World War II and Luftwaffe specialist.

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Mission Debrief

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The Editor

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Col José C. D'Odorico, Argentine Air Force (AAF), retired, logged more than 5,000 flying hours as a transport pilot in the AAF. For 37 years, he served as a professor at the Argentine Air War College. An aeronautic and military writer for more than 25 years, he reported to European and American journals such as *Air and Cosmos* (Paris), *Interavia* (Geneva), *Revista Aérea* (New York City), *Armed Forces Journal International* (Washington, DC), and *Aeroespacio* (Buenos Aires). Since 1964 he has written more than 200 articles on professional military subjects. Colonel D'Odorico is a graduate of École de Guerre Aérienne (Paris), Cours Supérieur Interarmées (Paris), and Inter-American Defense College (Washington, DC).

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Dr. J. Douglas Beason, Colonel, USAF, Retired, ***Los Alamos National Laboratory***
Dr. Alexander S. Cochran, ***National Defense University***
Prof. Thomas B. Grassey, ***Naval War College***
Lt Col Dave Mets, USAF, Retired, ***School of Advanced Air and Space Studies (professor emeritus)***

Brig Gen Qaid Al-Khuzaa'i, Iraqi Air Force director of operations, receives a copy of the first issue of *ASPJ*-Arabic from Col Bob Potter, USAF, deputy director for public affairs, Multinational Force-Iraq, in Baghdad on 21 February 2005.